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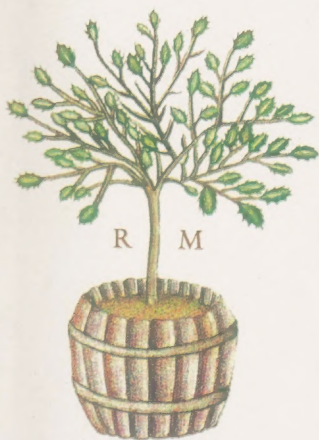
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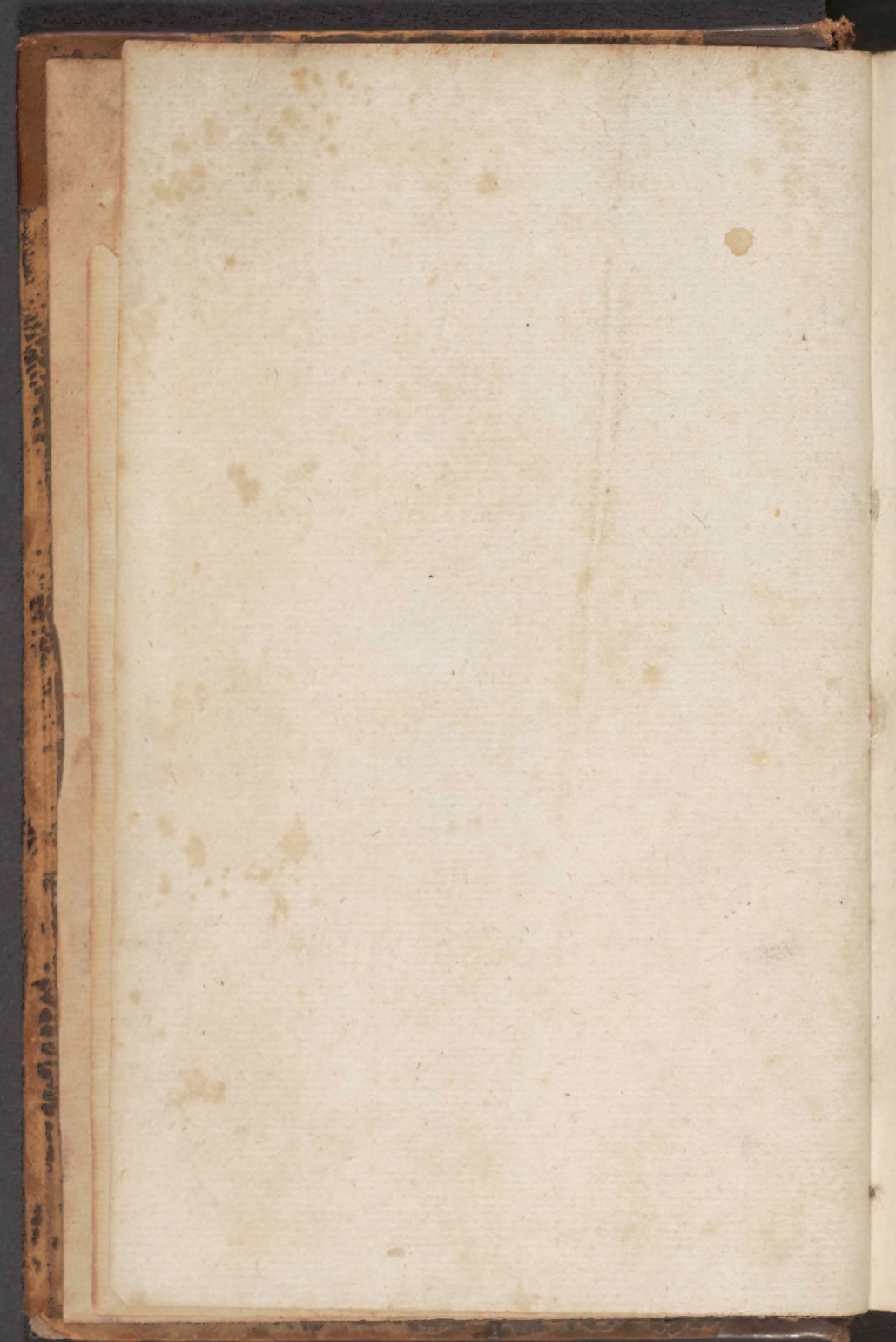
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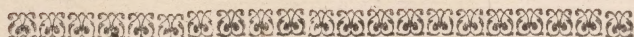
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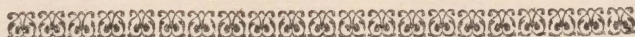
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Distributions into *Method*:

And the second,

The *Generation* of *Plants*, with their *Sexes*
and Manner of *impregnating* the *Seed*:
Also ^{some Thoughts} concerning the *Animalcula* in *Semine*
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Together with

The *Nourishment* of *Plants*, and *Circulation* of the
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Fellow of the ROYAL SOCIETY.

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T O
Sir ISAAC NEWTON, K^{nt}.

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And to the

Council *and* Fellows

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Advancement of Natural Knowledge:

A L S O T O

Sir HANS SLOANE, Bar^t.

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And to the

Censors and Fellows of the Royal College
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THE PREFACE.

BEING willing to gratify the ROYAL-SOCIETY, by entertaining them with some Discoveries and Improvements in Botany, I chose the different Sexes of Plants for my Theme. Their favourable Acceptance of my Discourses, and the Entreaty of several of their Learned and Worthy Members, encouraged me to enlarge upon that Subject, and to compose the following Treatise, which is now published at the Desire, and by the Command of that Honourable and Learned Body.

The considerable Progress of Botany in Britain of late Years, was that which engaged me the more cheerfully in this Undertaking; for as Dr. Grew was the first who discovered the two Sexes of Plants, and Dr. Morison is own'd by all to be the Restorer, if not Founder of the Method of distributing them secundum Cognationes & Affinitates, which has been since so much improv'd by Mr. Ray; so I resolv'd not to be wanting in

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making some farther Advancements in both, in order to render them more intelligible by the following Essays.

I have divided this Treatise into Two Parts, the one containing what is proper to Plants, and the other what is common to Plants and Animals. By the one I propose to instruct the Botanick Student, and the other is design'd for the Information of such as are more knowing in that Science.

As the Flowers and Fruit of Plants, are chiefly to be considered for their more convenient Distribution into Method, and for the better explaining of their Sexes, and manner of impregnating the Seed, so I have thought fit to treat of them in the two first Essays. In the first, I have describ'd the Parts for Generation in both Sexes; and the second gives an Account of the several Kinds of Fructification. In these I shew, wherein lies the difference betwixt Pistillum and Stylus, Calix and Perianthium, Siliqua and Capsula.

The Third Essay, which treats of the several Methods, is both useful and necessary. For Method has of late Years been so far multiply'd, the Plants so variously dispos'd, and the Authors of the several Distributions have had such Contests and Debates, which ought to be preferr'd; that instead of informing, they have often led their Followers into the Errors they themselves had advanc'd, and encreased Faction and Division in a Science
of

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of it self so very innocent, that they have actually broke out into a Paper and Botanick War; by which an excellent Institution is perverted, and what was intended for its Welfare, is like to become its Ruine. In order to prevent the Mischiefs of such a growing Evil, I have propos'd the following Means of an Accommodation: 1. To treat of the Origine and Progress of Method. 2. To acquaint the Reader with the general Rules laid down for the Establishment of each Method. 3. To examine every one of them briefly, and to enquire into their several Distributions, that I may shew how far each Genus or particular Species have been regularly or irregularly dispos'd, according to their Characteristick or Distinctive Notes: So that in few Sheets the several Methods have been so compar'd with each other, that the Botanick Student may soon be inform'd both of their Failings and Perfections. This has hitherto been much wanted, and has not as yet been attempted by any, except what Mr. Ray himself, and Dillenius have done, for the better Establishment of Mr. Ray's Method. In this I have behav'd so impartially, that I have given a full View of the Advantages, nor have I expos'd the Imperfections of any, beyond what was necessary to clear up the Truth; and I hope it will prove so beneficial, that without turning over the Volumes of the Methods themselves, the inquisitive

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quisitive Student may come to have so just an Idea of Method in the general, how such a Plant is plac'd according to the one, and how it ought to be plac'd according to the other, that being diligent he may soon arrive at a most intimate Knowledge in Botany. And for his better Assistance, I have given an Account of what is meant by Method, what a Characteristick and Distinctive Note is, how many of these Notes ought to concur to make up the Character of a Plant; and what is meant by Class, Sect, Genus, Species, &c. according to the several Authors. After that I proceed to the Examination of all the Methods that have been propos'd, from Dr. Morison down to this Time; such as Mr. Ray's, Ammannus, Herman, Rivini, Volkhammer, Tournefort and Knaut. Morison design'd to Class by the Fruit and Seed, and to distinguish by the Flower. Ammannus and Herman are the Improvers of his Method. Mr. Ray Classes by the Fruit, and distinguishes by any other part of the Plant which is most fix'd and unchangeable, whether it be by the Flower, with its Disposition and Number of the Petala, by the Disposition of the Leaf, or by the Root. Rivini Classes by the Flower, Volkhammer chiefly by the Seed; Tournefort by the Flower and Fruit, and Knaut by the Flower, with a little Variation from Rivini and Tournefort. In a word, this Essay is not only calculated for such Methods as have been estab-
lish'd

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bliss'd already, but also to render whatever Methods shall be propos'd hereafter, more easy and intelligible.

As several have treated of what is contain'd in the Second Part, viz. The Generation and Nutrition of the Plants, so I have endeavour'd to canvass their Writings so, as to add what I think has been wanting, to correct what by proper Experience I find they have advanced amiss, and to make several Discoveries and Improvements upon the whole.

In the Fourth Essay, which treats of the Generation of Plants, I have proceeded in the following manner: 1. I have shewn, that since Almighty God was pleas'd to impose a Necessity of two Sexes upon Animals, the same Necessity appears to be in Plants also. 2. That as no Seed can act within it self, for then it would be Agens & Patiens actu & potentia in Seipsum, as Sennertus well observes, so it is necessary for it to receive some subtile Particles from without, to act upon its gross Substance, and to dispose it Tempore & Loco Opportunis, to chit and vegetate. 3. I have endeavour'd to give some farther Proofs of this Necessity, from some negative Experiments. 4. This Necessity farther appears from the perpetual Presence of the Flowers before the Fruit, without which the Fructification cannot be perfected. 5. I have compar'd the several Parts of the
Flowers

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Flowers to those for Generation in Animals, and shewn, that the Farina must contain the Male Seminal Matter; because
1. Though all the other Parts of a Flower may be, and are actually wanting in some Plants, yet the Apices are never wanting.
2. The Apices are always full before the Flower is blown, and they are ready to shed the Dust when it is expanded. 3. The Seeds never begin to swell and augment before the Dust is shed.

see p.

270. to

p. 330.

In this, as in the former Essay, I trace the Origine and Progress of the Opinion, that Plants as well as Animals, have Male and Female Sexes, from Dr. Grew the Discoverer, down to this present Time; and am glad to find that the ROYAL SOCIETY has so great a Share in the Discovery and Improvement of what is able to give the clearest Light into the Knowledge of the Manner of Fecundation or Impregnation, not in Plants alone, but in Animals also. Dr. Grew it was who first gave the Hint to this Opinion. It has been handsomely and succinctly improv'd by Mr. Ray. Camerarius, (as himself acknowledges) was stirr'd up to make a farther Progress in it by their Writings. Mr. Morland, willing to accommodate the manner of impregnating the Seed in Plants to Mr. Lewenhock's Opinion concerning the Animalcula in Semine Masculino, communicated his Thoughts upon that Subject to the ROYAL SOCIETY, which
Mr.

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Mr. Bradly afterward confirm'd by going into his Opinion, and by proposing some other Flowers as Evidences to prove his Assertions. Mr. Geoffroy made use of Mr. Morland's Arguments, and Camerarius his Experiments, when he communicated his Opinion to the Royal Academy at Paris, which, by what I understand, Mr. Joisseux does not seem to be averse to, though Mr. Vaillant chuses to dissent from them, and joins Issue with Dr. Grew and Mr. Ray. Beside these, I find Boccone and Dillen^gius to be also of Dr. Grew's Sentiments.

Having perus'd and narrowly examin'd all these, I find their Opinions to be diametrically opposite to each other, and thus stated. EITHER the Farina falling upon the Pistillum, Vasculum Seminale or Semen, impregnates the Seed by means of certain subtile Particles, which penetrate into the Seed it self, and there actuate ~~the~~ the gross Particles previously in the Seed-Case or Uterus; OR it is a Congeries of Seminal Plants, one of which MUST enter the Vasculum Seminale, and there become the Semen, as Mr. Morland and his Adherents would have it. To know which of these ~~seem to be most probable~~ ⁺ I have with great Pains, and diligent Search, examin'd a great many Flowers this last Season, several of which I have ordered to be delineated, and their Figures to be engraven after the Life, and cannot find the least sign of Pro-

*+ Conjecture has the best bability
Right to be receiv'd,*

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bability for Mr. Morland's Opinion; but every Flower I have observ'd, shews quite the reverse; and if that Maxime hold good, which certainly it do's upon all other Occassions, that Nature is Uniform in all its Operations, and that there cannot be two different Ways of performing one and the same thing, Mr. Morland's Opinion must needs fail. And farther, if it were what he contends for, then the Farina would always be proportionable to the Seed to be fecundated, the contrary of which is evident; for Caprifolium, one of his Examples, and Jallapa, have five Stamina and Apices only to one Seed; and Nicotiana has no more to above an hundred: Papaver has above a quadruple quantity of Stamina, to about half the quantity of Seed. 3. Though there be a plain and open Passage requir'd for the Admission of the Farina, if it is the Seminal Plant, yet there is no such thing requisite for the Effluvia, whose Prevalency is fully demonstrable in other Cases.

This Analogy betwixt Plants and Animals afforded me a good Opportunity of prying into Mr. Lewenhock's Opinion concerning the Animalcula. In the examining of which I find, 1. If the Farina in Substantia cannot enter the Embryones, no more can the Animalcula enter the Ovum Foemineum. 2. No Animal can be produc'd without the Concurrence of two Sexes, so that these Animalcula can only be produc'd by Male and
Female

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Female of their own Species. 3. There would not be so certain a Determination of the Number of the Foetus in certain Animals, if it depended upon one of them getting accidentally into the Ovum. 4. One of these small Animalcula could never infer so vast an Alteration upon the whole Female Body. And 5. The Foetus would not partake so much of the Temper and Passions, &c. of the Female, if it only were produc'd by the Male. These Considerations, will, I hope, give a clearer Idea of the Generation of Animals, than has hitherto been entertain'd.

The fifth and last Essay, contains the manner of Nourishment of the Plants. The want of a due Consideration of this Analogy, has hindred those who well understood the Circulation of the Blood in Animals, from applying so valuable a Discovery to the Sap in Vegetables, by which the several Phænomena concerning the Vegetation of Plants, have hitherto seem'd very difficult to be explain'd; and I hope it will not be disagreeable that I inform the World I have now so far discovered the Circulation of the Sap in Plants, as to render every thing concerning their Nourishment, Growth and Encrease, most plain, obvious and easy to be understood.

I have trac'd the Knowledge of the Folia Seminalia previously in the Seed, before Vegetation, from Josephus de Aromatariis the Discoverer. I have set aside the Philosophical

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phical and Chymical Terms, of Attraction, Suction, Fermentation, Concoction, Digestion, &c. and plac'd the Nourishment upon the simple Footing of the Configuration of the Particles and Pores by which the assimilating Quality of the Ancients will be more easily understood. I proceed to shew, 1. That Plants are fed by the Extremity of the Fibers of the Root, as Animals are by the Mouth. 2. That 'tis by a continual Succession of Nutritive Particles, which enter certain Tubuli at the Root, that the Plant is stretch'd forth and extended; that when they are arriv'd at the Extremity, they cannot all flow out, but most of them must return towards the Root, which re-ascending, perform that which is called Circulation. This I have prov'd, 3. By the different Position of the Branches from the Fibers of the Root; for whereas the one must be the Consequence of the lateral Ascent of the circulating Particles, so the other must proceed from their lateral Descent, because of their Position obliquely downward. I have demonstrated how the Carnous and Parenchymatous Roots in some Plants, and Fruit in others, may have a particular Circulation different from that of the whole Plant, analogous to that in several parts of Animals. I have compar'd the Bark, Wood and Pith of a Tree, to the Skin, Bones and Marrow in Animals, given an Idea of their Perennial and Annual Surface, and made it appear,
6 that

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that they are reciprocally nourished, i. e. when the Annual Surface is nourished and augmented, the Nutritive Particles circulate directly through the Perennial, without contributing towards its Augmentation; when the Annual Surface is decay'd, the Perennial is nourish'd; and when the Tree is stretch'd forth as to its length, it ceases to grow as to its Bigness or Grossness. I have likewise explain'd the reciprocal Motion of the Sap betwixt the Root and Top, for when the Vernal and Autumnal Shoots are push'd forth in the Spring and Autumn, the Fibers of the Root are only Mouths for Reception, and Instruments for conveying of the Sap upward; but when these Shoots have acquir'd their full Length, the Fibers of the Root are stretch'd forth, and the Bark and Wood is augmented, as at the Time of the Winter and Summer Solstices. I have prov'd this Circulation, by the Experiments of the Grafting, Inoculating, and Circumcision, and demonstrated it from the Observation of a stript Jessamine. I have ascrib'd a quite contrary Use to the external Pores and Tubuli of the Plant, and shewn, that Malpighi's Tracheæ, and Dr. Grew's Air-Vessels are for the efflux and not influx of Particles, and demonstratively prov'd an insensible Transpiration in Plants as well as Animals. And lastly, I have prov'd, that no Plant can be nourish'd but by the Earth;

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for though they may live in the Air, and by the Water, yet none of these can be said to nourish them, and have explain'd some Phænomena concerning the Succulent Plants.

I have confirm'd the whole, by having recourse to the parallel, negative Operations in Animals, by some curious Remarks, and practical Observations: To which I shall add a few more in this place, as, 1. That the Preparation of the Nutritive Particles depends upon the Configuration of the Pores, appears from the Vilcum, which being nourish'd by the ascent of Particles from the Earth, and variously prepar'd in their Passage throughout the several Tubuli of the Tree, affords, (by the Chymical Analysis,) a greater quantity of active Principles than any other cortical or ligneous Substance in these cold Climates, as has been experimented by the laborious Endeavours of that Learned and Expert Physician Dr. James Douglass, R. S. S. who procur'd a great Quantity of Volatile Salt, Spirit, Fœtid or Empyreumatick Oil, and Phlegm by one Process, and Essential Oil by another: Also a good quantity of fix'd Salt by Combustion, so that we may admire the Sagacity of the Ancients, who being assisted by no such Experiments, were (as it were) by an Instinct, taught to prescribe it in Cephalick and Epileptick Cases, along with the Parts of Animals. 2. The lateral Tendency of this Sap, when interrupted in its Ascent, analogous to that

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that of the Blood at an Amputation, is obvious from an Experiment of Mr Fairchild's (whom I have often mention'd, and to whom I owe all the practical Observations I have advanc'd concerning the Vegetation) He cut the Stalk of a white Lilly from the Root, and topp'd it when it began to flower, and in a short time it push'd forth Bulbos from the sides of the Stalk, which when put to the Ground, sent forth Fibers, and became Roots.

3. He observes, that if a Tree is planted in the Autumn, it ought not to be topp'd until the Spring following, for the Sap circulates more agreeably, when allow'd to ascend directly to the top of the Autumnal Shoot, than when interrupted by the cutting it off at the Planting.

4. Some Years ago he observ'd a Plant of an Hedge hog Aloe all in a Sweat in the Green-House, and wet as if it had been dip'd in Water; of which he could not understand the Reason till next Day, that he found the Plant was dead. This abundantly confirms what I have said concerning the insensible Transpiration, and the harm that may happen to Plants as well as Animals, from too patent, or too much obstructed Pores, or a Plethora, and too great a Distention of the Vessels; in the like Cases his Method of Cure since is a timely Incision, analogous to Blood-letting in Animals.

My extending the following Treatise to such a Length, is the Reason why I have di-

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verted the Reader so much by a Preface, in which I was resolv'd to inform him previously with what is to be expected; and to shew that I have not trifled over so many Sheets in vain. The frequent Citations have enlarg'd the Bulk of these Essays, and some may be ready to look upon them as mere Plagiarism upon that Account. Though I have made use of the Sentiments of several Authors, yet I have ingenuously confess'd from whence I had my Helps; and though all I have borrowed were remov'd, these Sheets need not fear the Fate of the Daw in the Fable, to be unplum'd and laugh'd at; for if what is contain'd in them were contracted within narrower Bounds, there would still remain several Things of moment that are new, wherewith to exercise the Thoughts of the Curious.

As the ROYAL SOCIETY have been pleas'd to approve of this Undertaking, so I hope it will not be unacceptable to the Royal College of Physicians also; and if other such curious Persons, as are knowing in the Natural History and Botany shall be pleas'd with them, I shall obtain what I desire. I was once afraid, that the agreeable Science of Botany should be at a Loss by the Death of Mr. Ray and several of his Correspondents, but I am glad to find that it still continues in its former Vigour, under the happy Influence of Sir Hans Sloane, President of the College of Physicians, to whom I have been singularly oblig'd. Dr.
Sherard

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Sherard who had the Civility to afford me the use of what Books I wanted to farther my Design; Dr. Tancred Robinson, and Dr. Dale, all of them Mr. Ray's good Assistants and Contemporaries, yet alive. To whom may be added Mr. James Sherard, well acquainted with the Indigenous British Plants; Mr. Rand, an Ingenious and Expert Botanist, Overseer of Chelsea Garden, and Mr. Millar his Assistant; Mr. Dandrige, a curious Botanist, and Natural Historian, and famous for his Collection of the Eggs of most of the Indigenous Birds in Britain; The Honourable Lord Colvil, an expert Botanist (and knowing in most of the liberal Sciences) in Scotland; And Mr. George Prestone, an Indefatigable Botanist, and Intendant of the Physick Garden of Edingburgh, with several others in this Island. And if, after the constant and assiduous Observation of the Plants themselves, I have been enabled raptim, and as it were in a Hurry, to expose these Essays, as the Effect of the Discoveries and Improvements of one Season, I hope the Candid Reader will excuse what Irregularities and Incoherencies I have been guilty of, since 'twas the Matter, not the Manner of prosecuting my Design, I was most intent upon, that he'll accept of what is here advanced as an earnest of my Desire of Improvement, and pass by my Infirmities; for Humanum est errare, Weakness is sometimes bewray'd in the best of Performances.

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ERRATA.

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EXPLICATION OF THE TABLES.



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b
male-

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6

Explication of the Tables.

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BOTANICK ESSAYS.



ESSAY I.

Upon the Structure of the Flowers.

S the Generation of *Animals* has ever been look'd upon to be one of the most mysterious Parts of the Creation, in which the infinite Wisdom of the *Great Creator* is daily more and more manifested, so the *Vegetables* have sufficient Curiosities in them wherewith to exercise those rational and super-eminent Faculties with which the Soul of Man is endow'd. *Animals* are such curious Pieces of Mechanism that the Ingenious have from all Ages consider'd them as fit Objects of dili-

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gent

gent Enquiry: but for the *Vegetables*, their Parts seem at first view to be so simple, that the prying into their Structure has been much neglected. Ancient and learned *Botanists* contented themselves with viewing the *facies externa* of Plants, in order to distinguish them from each other; and if they had the good Fortune to impose such Names upon them as are retain'd to this Day, yet they were generally so superficial in describing them by these Names, that the modern Writers in *Botany* have great difficulty to know which is which. The word *Eupatorium* was frequently us'd in former Times; now we find three Plants, vastly different from each other, under the same Name. *Eupatorium Veterum* is now understood for *Agrimonia*; *Eupatorium Avicennæ* is that which passes under the Name of *Eupatorium Cannabinum*; *Eupatorium Mesues* is the *Ageratum*. *Dioscorides* says, that the Herb *Hyssopus* is known to every one; and the learned Dr. *Tournefort* observes^a, “ That the *Hyssopus* of *Dioscorides* is an Herb, which is scarce known to any, though he performs Miracles by it; for having compar'd *Origanum* with *Hyssopus*, *Centaurium Minus*, *Tragoriganum*, *Serpillum Marum*, *Polycnemum*, *Symphytum Petreum*, *Ageratum*, *Papaver eraticum*, are all, according to him, like unto *Origanum*.” The Ancients have cer-

^a Tourn. *Ilagog.* in *Rem Herb.* p. 14,

tainly had another *Centaurium* and *Chelidonium Majus*, for they could never be so ignorant as to believe *Centaurium* and *Chelidonium Minus* were of the same Genus with them.

As Arts and Sciences came to be more and more cultivated, so the delightful Science of *Botany* still arriv'd at a greater Degree of Perfection. They first began to distinguish the Plants according to the Nature and Texture of their Parts: Thus they which were of a harder, more durable and solid Substance, these were call'd *Arbores* Trees, and their Substances call'd *Lignum* Wood or Timber; such as are of a woody Substance, but not so high a Stature nor of so long Duration, these are called *Frutices* Shrubs: A third Division is called *Suffrutices* Under-Shrubs, which are woody indeed, but are of a very low Stature and short Duration, such as *Lavendula*, *Hyssopus*, *Thymus*, &c. And lastly, they are called *Herbæ* Herbs: these are of a very soft Texture, and only endure but for one Season, or at most till they have perfected Fructification, and produced ripe *Seed* for the Propagation of the *Species*, and then they decay. These, according to their Duration, are either propagated by the Seed, which, according as it ripens the first, second or third Year, if the Root decay immediately thereafter, is said to be an Annual, Biennial or Triennial Plant; or by the Root, which does not decay, but

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pushes

pushes out a fresh Herb every new Season, and then it is called a Perennial Plant.

In former Times when Authors were about to give a History or Description of Plants, they had several very confus'd ways of ranking them: some according to the *Alphabet*, by which it could not be known which belong'd to one *Genus* and which to another: some according to their *Virtues*; but as there are many Plants whose Virtues are not rightly understood, and as there are several Plants of different *Genera* which partake of the same Virtues, the Distribution of the Plants after that manner is very uncertain: and some according to the different Seasons or Months in which they produce the Flower; but as there are several Plants of the same *Genus* which flower more early, or in the Spring, and others more late, or in the Autumn, as *Crocus Vernalis* and *Crocus Autumnalis*, *Gentianella Vernalis* and *Gentianella Autumnalis*, this way of classing the Plants can be useful to none but Florists, who are oblig'd to observe the Season of Flowering on purpose to adorn their Gardens at all Seasons of the Year.

At last, observing what an Harmony there was among the several Parts of the Plants; how several of them agreed together in the same Frame and Disposition of the *Leaf*, but perhaps differ'd in the *Flower* and *Fruit*; others agreed in *Flower* but differ'd in the *Fruit*; others agreed in *Flower* and *Fruit*

but differ'd in the *Root*, as *Iris Tuberosa* and *Bulbosa*, Authors bethought themselves of classing the Plants, according to the Similitude of a particular Part of one Plant with that of another; as by the *Root* there are the *Radices Bulbosæ, Tuberosæ, &c.* by the *Leaf* *Asperifolæ, &c.* by the *Flower* according to their *Petala, Monopetali, Polypetali, &c.* Disposition of the *Flower Umbelliferæ, Corymbiferæ, &c.* according to the *Fruit Seminibus Nudis Solitariis, or Aggregatis, Capsulis inclusis, as Unicapsulares, &c.*

After that there arose a Debate among Authors, which were the principal Parts of the Plants by which they may be the most conveniently class'd together: some were for admitting of one part as only essential, others for two or three together, and a third sort were for bringing in all these as essential Parts, which kept a certain Rule, and were always the same in every *Genus*, or each individual Species: v. g. If one kind of Plants had always a *Bulbous Root*, another *Leaves* alternately upon the *Stalk*, a third *Genus* had the *Leaves* arising by Pairs, some *Genera* had an *undivided Leaf*, and in others they were *divided* into several *Segments*, they did not doubt but *Plants* might be join'd together by these *Notes*, as well as by any other.

The first we find who condescended upon any particular Part or Parts of the Plant, as being most essential, and by which they ought

to be more especially ranked together, was that celebrated Natural Historian, *Conradus Gesnerus*. He writing to *Boccone*, tells him, that he was very exact in delineating the *Seeds* and *Flowers*; "for (says he) it's from "the *Seed* I usually determine the Affinity of " *Plants*^b". And again, in his *Epistle* to *Theodorus Zuingerus*, he writes, "'Tis from "these (says he) viz. from the *Flower* and " *Fruit* of *Plants*, rather than from the " *Leaves*, that the Nature and Affinity of "the *Plants* appear: for it's by these Notes, " (to wit the *Fruit*, *Flower* and *Seed*) that " *Staphisagria* and the *Plant* called *Consolida Regalis* are distinguished from *Aconitum*, though they agree in the *Leaf*:" And in his *Epistle* to *Adolphus Occon* he plainly declares his Mind, "^d *Melissa Constantinopolitana* seems in some measure to resemble *Lamium* or *Urtica Mortua*, but it dif-

^b In seminibus & floribus *asclepiada* pingendis valde sum curiosus & a semine maximè cognationes stirpium judicare soleo. Epist. Medicin. lib. 3. Epistola 13. 14 ad Bocconem.

^c Fundamenta hic maximè ponebat Gesnerus in flore & fructu plantarum. Ex his enim potius quàm foliis stirpium natura & cognationes apparent. His notis à fructu semine & flore *Staphisagria* & *Consolidam Regalem* vulgo dictam *Aconito* *triumfidum* sive *Bardus* facile deprehendi. Epist. p. 113. ad Theodorum Zuingerum.

^d *Melissa Constantinopolitana* ad *Lamium* vel *Urticam Mortuam* quodammodo videtur accedere; seminis tamen, unde ego cognationes stirpium indicare soleo, figura differt. Epist. p. 65.

“fers from it by the Figure of the *Seed*, by
 “which I use to judge of the *Affinity* of
 “*Plants*.”

Fabius Columna is the next who declares
 his Mind, concerning the Manner of distri-
 buting the Plants by the *Flower* and *Fruit*.
 “I do not value (says he) the Shape of the
 “*Leaf* in making up the *Genera* of *Plants*,
 “but I determine their Kindred and Family
 “to which they belong, by the *Flower* and
 “*Seed Vessels*, or rather the *Seed* it self,
 “especially if they agree by the Taste with
 “the other Parts of the Plant. This is what
 “has not been observ’d by *Botanists* before
 “this time, neither by *Dioscorides* himself,
 “nor yet by the Ancients.”

Casalpinus is the third who gave any con-
 siderable light into that of distributing the
 Plants by Method, as is related by *Tourne-*
fort 3. “This Part of *Botany* (says he) not
 “yet essay’d by any, was manag’d by *Casal-*
 “*pinus* with a great deal of Industry; who
 “was the only one among the *Botanists* who
 “gave the Reasons worthy of a Philosopher,

“ *Tournef. Histog. in Rem Herb.*

“ *Foliorum effigiem in conferendis generibus parvi faci-*
mus, non enim ex totis sed ex flore feminisque conceptaculo
aut potius ipso semine plantarum affinitatem dijudicamus
(respondente partim sapore in reliqua parte plantæ) quod
huc usque ab Herbanis nondum animadversum nec ab ipso
Dioscoride nec ab antiquioribus. Ephial. minus cognitarum
stirpium pars altera. c. 27. p. 62 & 63.

“ *Ibid. p. 66.*

“ for distributing the Plants into a Method,
 “ according to the Manner of their Seed.”
 But he is so obscure in laying down his Method, that neither *Tabernomontanus* nor the two *Baubini* would make use of this Method of *Columna* and *Cæsalpinus*; nor would any other attempt it before Dr. *Morison*, as is justly observ’d by *Knautius*^h; and *Caspar Bauhinus* gives the following Reason for it. “ *Cæ-*
 “ *salpinus*’s Method of Plants (says he) was
 “ much in my mind: I spent much time in
 “ reading, that I might class my Plants by it.
 “ He is a learned but most obscure Author.
 “ I had great difficulty to understand it. I
 “ know not how he can be understood by
 “ Disciples and Studentsⁱ.”

From all these it plainly appears, how long it was before *Botanick* Authors so much as dream’d of disposing Plants into a Method, and how obscurely these Hints were given, by those who first determin’d by which part of the Plant they should be class’d; so that it is evident, the true Method of distributing and classing them was never thoroughly understood until Dr. *Morison* both began and brought it to great perfection; whatever can be alledg’d

^h Method. Plant. Genuina. p. 4.

ⁱ Cæsalpini de plantis liber multum mihi obsuit, in quo legendo diu hæsi, ut in meas classes referrem: doctus est sed obscurissimus; multas mihi parit molestias in eo intelligendo; nescio an à Tironibus & studiosis intelligatur. Epist. ad Sigismund. S. Schræterium.

or affirm'd to the contrary: But how he began it, after what manner he prosecuted it, and what improvement the *methodising* of Plants has since receiv'd shall be declar'd hereafter. But as the *Flowers*, *Fruit*, *Seed Vessels* and *Seeds*, are the principal Parts of *Plants*, as 'tis chiefly by them that *Plants* have been distributed of latter Years; and as the Structure and Use of their several Parts, especially of the *Flowers*, have hitherto been much neglected, I shall first explain them separately, and then declare the Use which is made of them, in order to find out their true *Genera* and *Species*, and what their Use is in impregnating of the Seed, in order to the Generation and Propagation of the several Species.

A *Plant* is an *organical Body*, endow'd with a *vegetative* not *sensitive Life*, adhering to one particular Place from whence it receives its Nourishment; having always a *Root*, for the most part bearing *Seed*, and frequently endow'd with *Leaves*, *Stalks* and *Flowers*.

It might have been asserted in the Definition, that *Plants* have always *Seeds* as well as *Roots*; for we cannot suppose any *Plant* to have been first propagated but by the *Seed*; but since there are some Species which are generally barren, that is to say, which are seldom or never observ'd either to bear *Flower* or *Seed*, therefore it's said, that *Plants* for the most part have *Seed*, v. g. There is in most
Gardens

Gardens in *Scotland* the *Chamæmelum Sterile*, and here in *England* as well as in *Scotland* the *Acetosa Muscovitica Sterilis*, both which are seldom or never observ'd either to bear *Flowers* or produce *Seed*, the Manner of propagating them being by the Root. The *Hedera Arborea* is said to have one Species, which is barren, but I'm ready to believe that's a Mistake; for it has been observ'd, that when it's planted in a convenient Soil, in a suitable Season, it will change the Figure and Fashion of the *Leaf*, from being blewish, broad, and more angular, to become more narrow, dark, green and pointed, after which it pushes forth the *Flower* and bears the *Fruit*. *Epimedium* and *Hydrocotyle* of *Tournefort*, or *Cotyledon-aquat.* were through inadvertency look'd upon as barren formerly, because their *Flower* is never seen unless you turn up the *Leaf*; and therefore the *Epimedium* is still known by the Name of *Barrenwort*.

Vinca pervinca, or *Clematis daphnoides*, flowers plentifully every Year, but never produces the *Pod* or *Seed Vessels* in its native Soil, especially in these colder Climates; because most of its Nourishment is spent in sending forth abundance of new Twigs and Leaves, by which it overspreads the whole Ground; but if it be put into a Pot, and all its *Stolones* or *Shoots* be taken off, but one or two of the strongest, then it will produce the *Pod* or *Seed Vessel*, which shall contain *Seed* till it ripen,

ripen, according to the Observation of Dr. Morison and Dr. Tournefort.

Acorus Verus S. Calamus Aromaticus being planted in a Garden will seldom or never bear a Flower or Spike, and but rarely in its native (*i.e.* a Marsh or waterish) Soil, because its Nourishment is as much exhausted upon its running Root below, as it is in the former upon the Leaves and Stalks above Ground.

A *Plant* is said to adhere to one particular Place from whence it received its Nourishment, because all *Plants* are not nourish'd by the *Earth*; for those called *Parasitical Plants* are nourish'd by ~~any other Substance~~ ⁺ the *Earth*. The *Cuscuta*, though it sprung from the *Seed* which falls to the Ground, yet no sooner does it catch hold of any other *Plant*, as *Thymus*, (upon which account it is called *Epithymum*) or upon the *Linum Sativum*, (when it still retains the Name of *Cuscuta*) ^{but} it immediately quits the *Earth*, and by sending forth several small Nails (as it were) which are drove into the very Substance of the *Plant*, it receives the nutritious Particles, which are converted into its proper Substance. *Hedera Arborea* will indeed receive its Nourishment from the *Earth*, when it has nothing else to lay hold on or grasp, but as soon as it touches any live or or growing *Tree*, or any *Wall*, whether of *Stone* or *Brick*, it fixes its Tendrils into the

^{Bark}
+ other plants, and prefer the nourishment they get from them, and either receive none or none so fit for them that comes unprepared from

X Bark or Substance of the Tree, or into the Interstices betwixt the Stones and Brick in the Wall, from whence it receives its Nourishment, and quits, or partakes but little of the Earth: But the *Viscum* denies any Commerce or Correspondence with the Earth at all; for if the Berry fall to the Ground there the *Seed* perishes; but if plac'd upon any Tree it there takes root, and encreases by dispersing the Fibres of its Root throughout the whole Substance of the most solid Tree, such as Oak, and a great many other Trees, as other Plants do in the Earth.

Plants may be *Acaules* or want a *Stalk*, as the *Lichenes*, *Aphylli*, or *Nudi*, wanting *Leaves* as the *Junci* and *Scirpi*. They may want the *Flower*, at least obvious to the naked Eye, as the *Capillares*; though by the Help of Magnifying Glasses, they are observ'd to have a regular Flower as well as other Plants, which are either plac'd upon the back of the Leaf, and therefore they are called *Epiphyllispermae*, because both *Flower* and *Seed Vessel* were formerly taken for the *Seed*, as in the *Polypod* and other *Ferns*, or upon the top of the Stalk, for which they are called *Florids*, as the *Osmunda Regalis*, and *Filicula Montana*, *Florida Perelegans*; but no Plant can be without Seed, unless there be some other Means by which the Plant is propagated.

X Memorandum, to try to raise ^{Therefore} Mistletoe on the Oak, by applying it to Oak-buds, and to the young twigs having first open'd the Bark & rais'd it.

Therefore I cannot comply with *Dillenius's* Sentiment, who defines a *Fungus* or Mushroom, to be a kind of "barren Plant without Flower or Seed, produc'd by a putrid or rotten Ferment; (upon which account, says he, it is, that they generally spring in a moist and rainy Season, and are, for the most part, of a soft and spongy Substance) but the Species is preserv'd by a certain specific and corruptible Juice, from whence it arises; so that by this putredinous Motion the Texture and Principles of the Vegetables are much altered, and almost destroyed^k." I must confess this is a new Philology to me, but most improbable; for as it can be made appear by frequent Experiments, that Insects are not produc'd *à putredine*, which was the Opinion of the Ancients, *sed ab ovo*, so we have the same Reason to believe, that no kind of Plant can be generated *à putredine sed à semine*; and it's but a bad Argument, because their *Seeds* have not yet been discovered by *Microscopes*, therefore they are not; but the *Seeds* of these, formerly reckon'd *imperfect Plants*, have now been fully discovered, as fully appears from the *Memoirs of the Royal Academy at Paris*, for the Years 1711, 1712. concerning the Vegetation of the *Tubera Trees* or *Truffles*, and concerning the *Fuci Marini*.

^k Dillen. de Plant. Circa Gissam nascent. Nova Plant. Spec. Clas. de Fung. p. 27. Edit. 1719.

Leaving the Consideration of such Parts of the Plants as are of less moment for my Design, I now proceed to the more particular Description of the *Flowers*, and the several Parts of which they are compos'd.

A *Flower* then is the most tender and delicate Part of the *Plant*, remarkable either for its peculiar *Colour* or *Figure*, or for both; coherent with the *Rudiments* of the *Fruit*, to whole tender Parts it seems to give the first Supply of Nourishment.

I am not much of *Tournefort's* Opinion, that the *Flower* affords any Supply of Nourishment to the *Fruit*; (though by his Example I have made it a part of the Definition:) One part of its Use indeed may be to guard the tender *Fruit*; but for the Nourishment, both the *Fruit* and it are oblig'd to the proper *Pedicle* or *Foot-Stalk*, if there be any, or to the common *Stalk* from whence it arises, if there is no *Pedicle*, which is a liberal Mother, and nurses both equally as their several Exigencies require.

Flowers in general are compos'd of the *Petala* or *Flower Leaves*, the *Calix* or *Cup*, the *Perianthium* or *Cover-flower*, the *Pistillum* or *Pestil*, the *Stylus* or *Stillet*, the *Apices* or *Tops*, the *Stamina* or *Chives*, the *Capillamenta*, *Threads* or *Thrums*: or if you please they may be divided with the learned Dr. *Grew* into three constituent Parts, viz. the *Empalement* or *Calix* and *Perianthium*;
the

the *Foliature* or *Petala*, and the *Attire* or inner Furniture of the *Flower*, such as the *Stamina*, *Apices*, *Pistillum*, *Stylus*, &c. or they again may be divided into their outer and inner Part; the outer Part consisting of the *Petala* and *Calix*, or *Perianthium*; and the inner, which is the same with Dr. Grew's *Attire*.

The *Petala*, according to Dr. Tournefort, are those *Leaves* which excel all the other *Leaves* of the *Plant* in *Shape* and *Colour*, and which never become the *proper Seed Vessel*; they are that thin and delicate Substance which surround the other Parts of the *Flower*, whose shining Beauty, and vast variety of Colours attract the *Eyes*, and create a great deal of Pleasure and Delight, affording a most agreeable Spectacle to Beholders both in *Gardens* and *Fields*, which engage a great many to a particular Consideration of their *Number*, different *Colours*, and variety of *Stripes*; and which, together with the Manner of propagating and improving the *Flowers* abounding with such, is become a particular Science, distinguish'd by the Name of *Florist*. In a word, they are an Ornament to the *Flower*, as the *Leaf* is to the *Stalk* and *Branches* of the *Plant*, with this Difference, that the other *Leaves* are always green, but these are still distinguish'd by their Colour. *Fabius Columna* was the first who, according to Tournefort, made use of the word *Petalon*

to distinguish the *Flower Leaves* from the other *Leaves* of the *Plant*.; since which it has always been assum'd as a *Term of Art*; and I rather chuse to call it *Petal* in *English*, than to express it by that compound Word of *Flower Leaf*. They are sometimes of a green Colour, so near to that of the other Parts of the *Plant*, that they are scarcely to be distinguish'd from the Leaves of the *Perianthium*, (whereof hereafter) unless with *Tournefort* it be observed, that they never become the *Capsula* or *Seed Vessel*; and therefore the *Flowers* of both the *Hellebores* may be said to be *Petalous*, though most of them (except the *Helleborus Niger Flore Rosæo*, and that called *Aconitum Hyemale*, which is also an *Hellebore*) are of a greenish Colour, and more durable than *Petala* usually are, because they never become the *Seed Vessel* or *Capsula* to the *Fruit*; upon which account they may be distinguished into *Petala Caduca*, i. e. those which fall off as soon as the *Fruit* begins to set or frame, or *Seed Vessels* be so strong as to resist the Injuries of the Air; though I do not look upon that as their only Use, as some others do; and *Petala non caduca sed marcescentia*, when they do not fall off as they decay, but waste upon the top of the *Fruit*, as in the *Campanulæ*, and most of the *Leguminous Plants*.

The curious Dr. *Grew* has some pretty Observations upon these *Petala*, which he calls
the

the *Foliature*. “ 1. In regard of their *Texture*,
 “ they are either fat and firm, standing upon
 “ a broad and strong Base, and so need no
 “ *Empalement* or *Calix*, as *Lilies*, *Tulips*,
 “ *Columbines*, &c. or delicate, tender and
 “ fine, arising long, small and slender from
 “ the bottom, and surrounded by the *Peri-*
 “ *anthium* or *Husk*, as in *Julyflowers*, and
 “ all that kind of *Flowers* called *Flores Ca-*
 “ *ryophyllæi*, such as *Lychnis*, &c. to which
 “ the *Long Tubulous Empalement* seems to
 “ be necessary; for without it, all of them
 “ would break forth out of their *Compass*.
 “ 2. In respect of their several *Foldings*; and
 “ that either in the *Close Couch*, as in *Roses*;
 “ *Concave Couch*, as in *Blattaria Fl. Albo*,
 “ &c. next the *Plait*, as in some of the *Pea*
 “ *Blooms*; next the *Couch* and *Plait* toge-
 “ ther, as in *Marygolds*, *Daisies*; the *Rowl*,
 “ as in the *Flowers of Ladies Bowers*; next
 “ the *Spire*, which is the beginning of the
 “ *Rowl*, as in *Malva*; the *Plait* and *Spire*
 “ together, as in *Convolvulus Doronici Fol.*
 “ In some *Flowers*, where the *Attire* is lofty
 “ or spreading, as in the *Malva Rosea*. The
 “ *Leaves*, with the *Spiral Fold*, are all tack’d
 “ down at the top, thereby making up a blun-
 “ ter *Cone*, and so a more ample Space for
 “ the enclosed *Tube* and *Stamina*: In the
 “ *Poppy*, where the *Leaves* are few but very
 “ broad, and where a small *Attire* is enclos’d,
 “ they could not be reduc’d to any regular
 C “ Fold,

“ Fold, least the Air should fill up the *Vacuum*,
 “ and be prejudicial to the Seed; therefore
 “ they are cram’d up within the *Perianthium*
 “ by hundreds of Wrinkles or Puckers, as a
 “ *Cambrick Handkerchief* is, wrapp’d up and
 “ thrust into ones Pocket, &c. *

The *Calix* is the next outward part of the *Flower*. This *Tournefort* defines to be the back part of the *Flower*, distinguish’d from the *Pedicle* or Foot Stalk, by a certain kind of Grossness. By this Definition, the *Calix* and *Perianthium* must plainly differ from each other, though our Author makes no such use of it, and though most of the modern Writers use the one or the other without Distinction. But in my Opinion, that part of the *Pedicle* which is enlarg’d, and upon which the *Foliature* and *Attire* (as Dr. *Grew* expresses it) are plac’d, is the *Calix* of the *Rose*; and those five Leaves which surrounded the Bud before it was blown, may be properly called the *Perianthium*, from the Greek $\pi\epsilon\acute{\rho}\iota\alpha\theta\eta\varsigma$; and I think Dr. *Grew*’s word, *Empalement*, would import the same: Indeed the word *Calix*, as it signifies a Cup or Vessel, which contains any Liquor, may imply that part which supports the Flower, and upon which it is plac’d, and that part which involves, surrounds and guards it: but as *Calix* is become a Term of

* *Grew’s Anatomy of Plants*, Book I. Chap. 5. pag. 36. and Book 4. Chap. 2. pag. 164.

Art, as there is a palpable Difference betwixt it and the *Perianthium* in several Plants, as is observ'd in the *Rose*, where ever such Difference appears, I would call each by their proper Names; or at least I would so use the one, as not to neglect the other: Thus the *Calix* is the *Pedicle*, or Foot Stalk enlarg'd, to grant Space to the *Rudimentum Fructus*, which afterwards becomes the *Hip* in the *Rose* fill'd with those hard Seeds, commonly called the *Acini* or Stones; but the *Perianthium* is a Production of this *Calix*, or so many, *viz.* five Leaves arising from it, of a different Substance, the one being at first thick and pulposus, the other thin and membranous, broad at the Base, and narrower as the Bud tapers, and becomes *pyramidal* towards the top, straitly enclosing, and earnestly preserving the enclos'd tender *Petala*, until they have acquir'd a suitable Bigness, and such a durable Consistence, as to render them capable to resist the Injuries of the Air when blown; and these five Leaves of the *Perianthium* pleasantly depart from each other, and readily give way to the *Petala*, whose *Moles* is augmented by degrees, and strictly guarding and strengthening them at their *Ungues* or *Origine*, least by the Weight of the inner *Petala*, (especially in the full or Hundred leav'd *Roses*, as they are call'd) they should be too much depress'd, or violently distorted, and turn'd out of their natural Situation: Therefore it is, that

the *Calix* is seldom or never without a *Perianthium*, or a Division into so many green Leaves, (for 'tis by the Colour that they are distinguish'd from the *Petala* in most Flowers) which involve the *Petala* before Expansion, and guard and surround them after they are blown. Their Number is uncertain; sometimes where the *Petala* are few, the Leaves of the *Perianthium* are so too; they are either of the same Number, or just half so many, whether even or odd. *Leucanthimum* and *Alfane*, are *Pentapetalous*, the former has five Leaves, and the latter ten, for the *Perianthium*. The *Paonia*, while in the Bud, is covered with five Lives, arising streightways from the *Pedicle* it self, and are no ways Productions of the *Calix*, whereof the three inner are more thin and expanded Leaves, which over-spread the whole Bud; and the two outer ones are stronger, more round, situated at the Base of the Flower, to strengthen the other three, that they may be the more able to support the Weight of the Bud before, and Flower after *Expansion*, or after it is blown. In the *Calendula*, and *Bellis*, and most of the *Corymbiferae Radiatae*, there are a great many Leaves of the *Calix* which are divided from each other, making up a double or treble Border of a *Perianthium*, to support the *Petala* after Expansion, and keep them in their due Order. The *Calix* of such and the like Flowers, are either of one continued Piece, and
divided

divided into the Leaves of the *Perianthium* at the Border, or they are compos'd of several minute, thin Leaves, so dispos'd as the Scales of a Fish, and therefore are called *Calices Squamosi*, as in the *Capitatae*, such as *Jacea*, most of the *Corymbiferae Nudae* and *Radiatae*; and it is to be observ'd, that in the *Corymbiferae Nudae*; that is to say, when they want a Row of half Flourishes round the Border, then there is scarce any *Perianthium*; for there being no long *Petala*, or half Flourishes to support, there is no need of such.

According to this Distinction, it seems improper to call those two *Leaves* which guard the *Flower* of the *Papaver*, *Chelidonium maj.* *Glaucium*, or *Papaver Corniculatum*, till they are blown, and then do fall off, their *Calix*, and not their *Perianthium*; though Mr. Ray is pleas'd to call it *Calix Bifolius*, *Fugax Borrage*, *Chelidonium minus*, *Hepatica Nobilis*. *Tormentilla*, have rather a *Perianthium* than a *Calix*, because the five Leaves of the one, the three of the other two, and the four in the fourth, are divided to the *Pedicle*, which cannot answer the Definition of the *Calix*; neither do I think all the *Pentaphylla* and *Pentaphylloides*, which have alternative broad and narrow Leaves; the *Althea* and *Malva*, which have a double Row of them; nor the *Alcea*, which has but one Row, can be said to have a *Calix* but *Perianthium*. In the *Malvaceous* Kind, these

Leaves are as ready to guard the *Fruit* as the *Flower*, some more firm, and closely surrounding it, as the *Althea* and *Malva Rosea*; others not covering the whole *Fruit*, as the *Malva Vulg.* and *Arborea Maritima*; and others more loosely covering it, as it were a *Bladder*, as the *Alcea*; I say, in that case, these *Leaves* may be called *Pericarpium*.

In a word, There may be a *Perianthium* without a *Calix*, according to the foregoing Examples; as also in the *Male*, formerly called *Barren Flowers* of the *Pomiferae Scandentes*; according to this Rule, that when the *Leaves* are divided to the *Pedicle*, and that the *Pedicle* at the bottom of the *Flower* is no more enlarg'd, and has not become grosser than there elsewhere, then it is properly *Perianthium*: But very rarely, unless in the former Example of the *Flores Nudi*, shall you see a *Calix* without a *Perianthium*. I own there are some Flowers which have a *Tubulous Calix*, as the *Labiatae* or *Galeatae*, and *Verticillatae*, which afterwards becomes the *Pericarpium*, (as is observ'd in the *Malva's*) and guards the four *Seeds* till they are ripe; though Dr. *Tournefort* calls them *Capsula's*, which I think is wrong; for as I take it, *Capsula* is a *Receptaculum Seminis* or *Cloſe Veſſel*, which preserves the *Seed*, and never is opened till the *Seed* is ripe; here the *Veſſel* is always open at the top: I say, these *tubulous Guards* of the *Flower*, and
Preservers

Preservers of the *Seed* in the *Labiata*, and Surrounders of the *Pod* in most of the *Papilionaceous Flowers*, may be called *Calix* or *Perianthium*, as People shall think fit; or if it seem good still to keep up the Distinction, that part which guards the bottom of the *Flower*, and preserves the *Seed*, may be called *Calix*, and the expanded part which cover'd the tender *Bud*, and is divided into five pointed Portions after the *Flower* is blown, may be called the *Perianthium*. Thus far I have thought fit to instruct the young *Botanists*, that they may know where the Distinction of *Calix* and *Perianthium* lies, that they be not at a loss when they hear them term'd sometimes the one, and sometimes the other. The *Calices*, or rather the *Perianthia*, are divided into *Monophyllous* and *Polyphyllous*, as the *Flowers* are into *Monopetalous* and *Polypetalous*. Mr. *Vaillant* gives the Distinction betwixt them, viz. "When
 " you pull the one from the other, if it be
 " *Monophyllous*, then they will be torn at
 " the sides; but if *Polyphyllous*, then the
 " sides shall remain entire, even to the *Pedicel*."

Having thus discours'd of the outer and surrounding Parts of the *Flower*, viz. the *Petala*, *Calix* and *Perianthium*, I come next to its surrounded Parts, by Dr. *Grew* called the *Attire*; and these are either the *Male Parts*, such as the *Stamina* and *Apices*, or

Female Parts, such as the *Stylus* and *Pistillum*.

The *Stamina* or *Chives*, are several long, small, round Portions, arising either from the inner Surface of the *Petala*, especially in the *Monopetalous Flowers*, or bottom of the *Flower*, surrounding the *Pistillum*, each endow'd with a proper *Apex* or Top, by which they are distinguish'd from the *Stylus*, which either has no *Apex* at all, or if it has, is of a quite different Figure and other Colour, from the *Apices Stamina*, and from a *Capillamentum*, which is either divided or not divided at the upper Extremity, but still without an *Apex*. Mr. *Vaillant* divides them into the *Head*, which is the *Apex*, and the *Tail*. When they arise from the bottom, they are of a quite different Texture and Colour from the coarse Substance of the *Calix*, but consisting of fine and delicate parallel Fibres; are rather of the same Nature with the *Petala*, from which however they may sometimes differ in Colour, yet seldom or never in Texture. Their Number is often the same with the Number of the Segments in the *Monopetalous Flowers*, or the *Petala* in the *Polypetalous* ones, where the Number of the *Petala* is certain and determin'd, especially in the *Tetrapetalous* and *Pentapetalous* ones. Thus I have often seen in *Tormentilla* and *Ruta*, both of which are *Tetrapetalous* for ordinary, that if they had chanc'd to vary, the *Tormentilla*

mentilla had five Leaves in the *Perianthium*, if it became *Pentapetalous*, and *Ruta* had five *Stamina*, and became *Pentacapsular*, if it chanc'd to be *Pentapetalous*. *Camerarius* and Mr. *Vaillant* give us several Examples wherein the Number of the *Stamina* differ from that of the *Petala*; *Iris* has six *Petala* (*Camerarius* calls them nine, mistaking the *Tripartite Stylus* (Fig. 8. 222) for three of the *Petala*) to three *Stamina*, *Gladiolus* six to three, *Veronica* two to four *Segments*: The *Tetrapetale siliquosæ* six to four *Petala*, eight to many of the *Papylonacæ* which have only four *Petala*; *Balsamina*, according to Mr. *Vaillant*, has five *Stamina* to four *Petala*, *Hypocastanum* seven to five, *Cardaminum* and *Acer* eight to five, &c. Where the Number of both *Stamina* and *Petala* are determinate and certain, then it is easie for those who are at pains to observe them, to find out the Proportion they bear to one another; but few are at pains to sum up the Number of the *Stamina* or *Petala*, in the *Polypetalous* ones, *i. e.* such as exceed six; for beyond that, the Number of the *Petala*, and far less of the *Stamina*, is certain, as in *Ranunculi*, and most of the *Rosaceous Flowers*; *Chelidonium minus* and *Hepatica Nobilis*, have each for the most part eight *Petala*; most of the other single *Ranunculus Flowers* are *Pentapetalous*; but neither is that a Rule; and for the *Stamina*, that's altogether uncertain, especially
in

in the *Semine Nudo Polyspermæ*; some have such an abundance of *Stamina*, as the *Filipendula*, *Ulmaria*, that Mr. Ray by accident called them *Staminei*; for which being call'd in question, because the *Stamineous Flowers* make up a very large *Genus*, he altered the Expression afterwards, and called them *Staminosi*.

Every one of the *Stamina* has its proper *Apex*; these *Apices* are divided into two *Lobes* or *Celluls* of different Figures; those of *Malva* appear to be round to the naked Eye, and those of the *Lillies* and *Iris* are long, (1. Fig. 1. 1. Fig. 2. 2. Fig. 9.) those of the *Lillies* have rather four than two *Celluls*; for there are two *Lamine* join'd together *Longitudinally*, by a *Septum intermedium*, and each of these *Lamine* are folded up towards the *Septum*, the one above the other; the Point of the hollow *Stamen* is fix'd to the Center of the *Septum*; before the *Flower* is blown it enters the forked Extremity, and is situated betwixt the two upper *Celluls*, being fixed to the Center of the *Stamen*; but no looner is the *Flower* open, and the *Celluls* begin to shed the Dust, than it quits its hold of any other part of the *Apex*, but where its Point is fix'd; and thus 'tis so equally pois'd, that it must be shaken by the least Breath of Wind, and so disperse the *Farina* by degrees, by the forked Extremity till all the Dust is ripe; and then the whole *Lamine* are spread forth if it

is

is moist Weather, but in hot and dry Weather they are immediately crumbled up and dry'd. Thus I suppose it fares with all the *Flowers* with long *Apices*; but such as are round or globulous, whose *Stamina* are either crumbled within the *Calix*, or which are so fix'd upon the *Stamen*, that they do not move so easily as the former, the *Membranes* of their two *Celluls* for the most part open with an Elasticity, and shed forth the Dust all of a sudden, as Mr. *Vaillant* has express'd it at large, in treating of the *Parietaria* where the *Stamen* lies hid, and wrap'd up spiral ways like a Cork Screw, that you see nothing of the Flower but the four *Apices* till the Dust is ripe, especially in the Morning, when the Sun Beams begin to beat upon it; then do the *Stamina* extend themselves, darting out as it were the *Apex*, upon which the slender *Membranes* of the *Celluls* burst, and shed forth the *Farina* *quaguaversum*; the same I have observ'd with a great deal of Pleasure in the *Katkins* of the *Mulberry* in the Mouth of *April*, where these Flowers consist of four *Apices*, and have their *Stamina* crumbled up within the *Calix*, as the *Parietaria*, but several of them are join'd to a *Midrib*, and make up the *Fulus* or *Katkin*, of the same Shape with the aggregate Fruit, consisting of several little pulpous or juicy Berries, adherent to one common *Pedicle*, like the Fruit of the *Rubus* or *Bramble*, with this difference, that the *Mulberrys* are oblong,
and

and those of the *Bramble* round or spherical; but of this more hereafter.

The *Capillamenta* or *Chives*, are said by Dr. *Tournefort* to be the same with the *Stamina*, only that they want the *apices*. They are the small Threads or Thrumbs we observe to be lodg'd among the *Corymbiferæ nudæ* and *Radiatæ*; also among the *Flore composito papescentes* and *Lactescentes* of Mr. *Ray*, or in the *Flore flosculoso*, as *Scabioso semiflosculoso*, as *Sonchus*, *Lactuca*, &c. and *Radiato* as *Calendula*, of *Tournefort*. They are either *Bifida*, or divided into two Portions at the top, or *Simplicia*, whereof hereafter. So soon as these *Flosculi* or little *Flourishes* open, then these two Portions separate from each other, and are bended downwards like two Fish-hooks. Sometimes they are covered with a *Vagina* or Sheath at the top, which appears blackish in the middle of the *Flourish*, until it is fully blown, and then the *Sheath* falls off, and the two Portions separate, and both being loaded with a *Farina* or *Dust* (such as is contained in the *Apices* of other Plants) it is then dispers'd. The use of this upper Sheath (so I must call it in Distinction to that in the lower part of the *Flosculum*) seems to be to preserve the top of the *Capillamentum* till the *Farina* is fully ripe. This is very observable in the *Flos solis*, or *Sunflower* (where it is very obvious;) *Calendula* and several other *Radiate Flowers*, where the
upper

upper *Vagina* is so small, that it requires a Magnifying glass to observe it. Some compare them to the *Stamina*, but I rather chuse to compare them to the *Stylus* in other Plants; for 1st. They have no *Apices* or Tops. 2^{dly}. They arise from the bottom, and not from the sides of the *Flourish*. 3^{dly}. Each of them are situated upon the *Embryo seminis*, as the *Stylus* is upon the *Pistillum* of other Plants. Their number is indefinite, according to the number of the *Flourishes* and *half Flourishes*; and here it will not be improper to declare what is meant by the *Flourish* and *half Flourish* of a Plant.

A *Flourish Flosculum*, is a *Petalon* or *Flower Leaf*, which (as the *Petala* do in other, especially *double Flowers*) make up the whole Flower. They are long, small, hollow *Tubes*, expanded and divided into five, for the most part, pointed *Segments* at the top, either equal, as in the *Corymbiferæ nudæ*, as *Tanacetum*, or in the *discus* of the *Radiatæ*, as *Calendula Jacobæa*, &c. or into *unequal Segments*, as in *Scabiosa Cyanus*, &c.

The *Semiflosculi*, or *half Flourishes*, are *tubulous* or hollow at the bottom with the former, and soon spread forth into a *petalon-planum*, a broad, plain, *flower Leaf*. These either make up the whole *Flower*, as in *Dens Leonis*, *Hieraceum*, *Scorzonera*, *Trago-pogon*, &c. or along with the *Flosculi*, make up the *Corymbiferæ Radiatæ*, i. e. when the *Corona*
or

or *Radius*, the utter Border of the *Flower* next to the *Perianthium* or *Calix*, consists of the *Semisflosculi*, and the *discus*; the middle part of the *Flower* consists of the *Flosculi*, as in *Calendula*, *Bellis*, *Chrysanthemum*, *Flos solis*, &c.

Each of these *Flosculi*, and *Semisflosculi*, are situated upon the top of an *Embryo seminis*: At the bottom of each of them arise five small Portions or Columns, all which in a little unite together, and make up a *Vagina* or Sheath, surrounding the *Capillamentum*, which, as is said, arises from the top of the *Embryo seminis*. They are either *Bifida*, as above, or *Simplicia* undivided, as in *Scabiosa Centaurium maj.* &c. The use of the Sheath is to receive and contain within Bounds the *Dust*, as it falls upon the top of the *Embryo seminis*.

These being the Male Parts of the *Flower*, whose Use shall be declared hereafter, I now proceed to the *Female Parts*, viz. The *Stylus* and *Pistillum*; The *Stylus* for the most part accompanying the *Pistillum*, as the *Perianthium* does the *Calix*, is as much neglected to be mentioned by the Moderns, as the *Perianthium*; but the same Reason holds for using both; for when the *Stylus* and *Pistillum* meet both together, the *Stylus* is situated upon the *Pistillum*, but seldom of the same Substance, for when the *Pistillum* begins to swell, then the *Stylus* takes his leave
and

and falls off, which shews they are not continuous, but contiguous to each other.

A *Stylus* then, is a long, small, round Portion, more or less hollow, according to its bigness, placed in the center of the *Flower*, sometimes upon the top of the *Pistillum*, and sometimes not, always without such an *Apex* as the *Stamina* have, but sometimes covered with an *Operculum* or Lid, as in the *Lilies* (aaa) and sometimes fimbriated or fringed, being divided into several small Hairs at the upper Extremity, as in the *Malloes* (f)

The *Stylus* may be without the *Pistillum*, as in the *Galleatæ* and *Verticillatæ* and *Asperifoliæ*, where the *Stylus* is in the Center, and the four *Embryones*, which afterwards become so many Seeds, surround and support it. Dr. *Tournefort* in this Case calls it, *Pistillum quatuor Embryonibus stipatum*; though according to his own Acceptation of the *Pistillum*, it does not become the *Fruit*. The *Malva* also has an *Orbicular Fruit*, consisting of several *Cap-sule*; according to Dr. *Tournefort*, or of *Semina nuda, in orbem Rotuli aut Castoli formam posita*, according to Mr. *Ray*, all which adhere to the *Stylus* plac'd in the middle; and this again is guarded by a *Pyramidal Tube*, upon which the *Apices* are plac'd (dd). Now *Tournefort* in this Place neglects the *Stylus*, and only speaks of the *Fruetus rudimentum*, as the *Pistillum*, giving the *Stylus* (f) the

(aaa) Tab. 1. Fig. 1. (f) ibid. (dd) fig. 10. (f) ibid.

Term of *Axis Medius*, which plainly shews, that the *Stylus* and *Pistillum* are two distinct parts of the Flower.

Camerarius indeed speaks of the *Stylus* and *Pistillum*, as one and the same, and only makes the *Stylus* the upper, and the *Pistillum* the lower part of the *Embryo Fructus*: *Simultaneum istum petalorum apicumque exortum sequitur brevi tempore similis dilapsus, & tum Styli superstitis partem inferiorem intumescere, superiorem autem quasi Infundibulum paulatim marcescere* notant Botanici.

But as I hope I have made it obvious, that the *Stylus* and *Pistillum* are for the most part two distinct Portions, and that there may be a *Stylus* without a *Pistillum* at least under it, so there may be a *Pistillum* without a *Stylus*, as in the *Papaver*, &c. In a word, according to Mr. *Tournefort's* Method, the *Pistillum* is that part which becomes the *Fruit*, which the *Stylus* never do's, and it is always situated within the *Flower*, as the *Calix* is without it.

I have hitherto neglected to give the Use of all these Parts, because I shall treat of it elsewhere, I now proceed to the general Consideration of the Flowers themselves, and shall divide them either in respect of their Structure or Use.

In respect of their Structure, they are either *Monopetalous*, *Polypetalous* or *Apetalous*, and *Stamineous*, I rather chuse to divide them thus,

thus, than with Mr. *Vaillant* to divide them into *True* and *False*, *Complete* and *Incomplete*, *Perfect* and *Imperfect* ones; for in my Opinion, no created Being can be called *Imperfect*, so long as it consists of all those Parts by which it was design'd to be propagated and preserv'd at the *Creation*; and we are not to look upon those called *Apetalous*, or *Stamineous Flowers*, as *imperfect*, because they are not endow'd with those beautiful *Petala*, by which they are render'd so obvious and so delightful to the Eye: Nor upon those called *barren Flowers*, as the *Cucumers* and *Melons*, as *incomplete*, because when they fall off they leave no Fruit behind them. God who is the *Author* of Nature, or *Nature* it self, viz. That second Cause by which one Effect produces another towards the Generation, Preservation, and Propagation of any *Created*, whether *Animated* or *Inanimate* Being, never do's any thing in vain; and if these our Author calls *Incomplete* or *False Flowers*, do answer the Ules for which they were at first design'd, and consist of Parts fit for that Purpose, I see no Reason why such a Plant should be called *Imperfect*, for that would imply that it wants some Parts which hinders it from performing those *Offices* for which it was at first design'd; but of this more hereafter.

A *Monopetalous Flower*, is that which has one *Petalon* or *Flower-leaf*; they are

for the most part divided into five *Segments* at the Border, or a little deeper; but sometimes into three, as in the *Unilabiata*, as *Scordium* when the four *Stamina* supply the upper Lip. *Anomala* as *Acanthus*, when the Leaves of the *Perianthium* supply the upper Lip; sometimes into four *Segments*, as the *Veronica species*, and sometimes they are not divided at all, but being *Tubulous* at the bottom, they are afterwards expanded towards the Extremity, ending in a sharp Point, as *Arum*, *Aristolochia*, &c. and sometimes not expanded, blunt at the Extremity, as *Digitalis*; but the various Figures of *Flowers* are extrinſick from my Purpose, I shall only add, that *Monopetalous Flowers* are sometimes so deeply divided, that they can scarcely be distinguished from *Pentapetalous* ones: Thus *Malva* has been by some mistaken for a *Pentapetalous Flower*. And Mr. Ray, to reconcile the matter, calls it *Pentapetaloid*; and *Oxys f. Trifolium acetosum*, is by most Authors reckon'd *Pentapetalous*, though Dr. Tournefort calls it *Monopetalous*. The common way of distinguishing the *Monopetalous* from the *Polypetalous Flowers*, is to observe whether it falls off together, or in several Portions. Mr. Vaillant gives the following distinguishing Marks: 1st, If the *Calix* is *Monophyllous*, then the Flower is *Monopetalous*. 2^{dly}, If the *Stamina* must be separated from the sides of the *Petala*, then 'tis *Monopetalous*,

lous, as in *Gentiana*, *Campanula*, and most, if not all of the *Lip-flowers*; but if the *Stamina* immediately arise from the bottom of the *Flower*, as in the *Lilly*, then the Flower is *Polypetalous*.

The *Polypetalous Flowers*, are such as consist of more *Petula* than one: Thus they are *Bipetalous*, as *Circæa*, which is the only *British* Plant, I know of, that is so. *Tripetalous*, as *Phalangium Virginianum*, *Plantago*, *Aquat. major* and *minor*. *Tetrapetalous*, as *Papaver*; all the *Tetrapetala*, *Siliculosæ* and *Siliculosæ*. *Pentapetala*, as several of the *Rosaceous Flowers*, viz. *Ranunculus*, *Pentapphylla*, *Umbellifera*, and the *Flores Caryophylli* of *Tournefort*. *Hexapetala*, as the *Lillies*, and all the *Lilliaceous kind*. The *Iris* and *Xyphion*, or *Iris Bulbosa*, is truly a *Monopetalous Flower*, divided into six *Segments*; and I suspect there are several others of the *Lilliaceous kind Monopetalous* too, and therefore *Tournefort* being aware of this *Objection*, says, he has not establish'd this *Class*, because that all of them are *Hexapetalous*, but because all of them have a *Tricoccous Fruit*, or a *Fruit* divided into three *Loculamenta* or *Pouches*. I have already observ'd, that *Camerarius* call's *Iris*, *Enneapetalous*, being led into this Mistake by *Mr. Ray*, who once said so, which he afterwards retracts. The Truth is, at first Appearance the *Iris* seems to have nine *Petala*,

but if any one shall trace the *Stylus*, they'll find it to arise by a small, long, round Portion from the *Calix*, and to be contain'd for half an Inch length within a green *Vagina* or Sheath, till it arrive at the bottom of the *Flower*, where 'tis expanded into three narrow, bifid *Petala*, lying horizontally in the middle of the *Flower*, each hiding a *Stamen* below it: Another Reason why it's *Monopetalous* is, that it is *Flos non caducus*, which no *Polypetalous Flower* is. After the number of the *Petala* has come the Length of six, it is never afterwards determin'd, but all pass under the Name of *Polypetalous*.

The *Apetalous* or *Stamineous Flowers*, are a large and numerous *Class*; they consist of the *Calix* or *Perianthium*, and several *Stamina*, with their *Apices*, without any *Petalon* or *Flower-leaf*. Some of them have a *Capsular Fruit*, as *Asarum*, *Beta*; others have one single Seed succeeding to each Flower, as *Acetosa* and *Lappathum*, where there's an *Hexaphyllous Calix*, with several *Apices*; three of the Leaves of the *Calix* being broader, are enlarg'd afterwards, and become the *Capsula* to a three-corner'd Seed, and the other three become the Base of the *Fruit*. The *Acetosa Britannica*, of which I have discours'd at large in my *Miscellaneous Observations*, has a *tetraphyllous Calix*, and a flat, instead of a *triangular Fruit*. *Tournefort* says, There are some Species of the *Atriplex*,
whose

whose Flower arises separate from the Fruit; i. e. has *Male* and *Female Flowers*: The same is also observable in several Species of the *Acetosa*, as in the *Arvensis Lanceolata*, *Pratensis*, *Vesicaria*, &c. though he makes no mention of it. He justly makes two distinct *Genera* of the *Atriplex*, the one with a *flat Fruit*, which he calls *Atriplex*, and the other with a *starry Fruit*, among whom is *Atriplex fœtida*, and *Bonus Henricus*, *Blitum*, *Herniaria*, *Paronychia*, *Achimilla*, *Parietaria*, &c. with which Mr. *Vaillant* makes such a Work. All these have one *Seed*, succeeding an *herbaceous* or *greenish Flower*; but there are some Species of the *Persicaria*, *Potamogetons*, *Polygonum*, *Bistorta*, &c. whose *Calix* consisting of finer *Leaves*, and a brighter Colour, may at first View be mistaken for petalous Flowers. That large Tribe of *Flowers*, consisting of the *Frumenta Semine Esculento*, or *Farinaceo*, as *Triticum*, *Hordeum*, &c. which are *Spicata*, when many of their *Flowers* and *Seeds* are compactly join'd together, and are adherent to a *Mid-rib*, or *Axis-medius*, or in *Fasciculos Pendulos Disposita* as *Avena*, *Paniculata*, as *Milium*, *Panicum*, &c. and the *Gramina semine non Farinaceo*. All these have a *Stamen*, with a large *Apex*, which are the Forerunners of each single Seed. The third *Genus* of *Apetalous Flowers*, are such as arise in separate Parts from the Fruit, in the

same Species as *Cyperoides*, *Typha-Mayes* or *Turkey-Wheat*, &c. of which Mr. *Geoffroy* gives an account in the *French Memoirs*, viz. that there first appears a Spike of *Flowers* upon the top of the Stalk, which so soon as they are decay'd, there appear two or three Bundles of small Threads, which are the *Stylus* of the *Seeds*, hid as yet in *Foliorum alis*; but they afterwards swell and become a Fruit, consisting of a great many *Seeds* upon a long *Spike*. The fourth kind of these *Apetalous Flowers*, are such as arise upon different Plants, of the same Species, *i. e.* some Plants will produce Spikes of Flowers, to which no Fruit or Seed shall follow, when others shall have small *Globules*, several of which shall be compactly join'd together, which afterwards become the Seed without any previous Flower, as *Cannabis Mercurialis*, *Spinachia*, *Urtica*, *Lupulus*; though some Species of the *Lupulus* shall have Spikes of the Flowers and Fruit, and other Plants shall have *Globules* of the Fruit or Seeds, upon the same Stalk, as *Urtica Romana*, &c.

There are also several Trees, whose *Apetalous Flowers* arise in different Branches of the same Tree, or in different Trees of the same Species. Several of these *Flowers* are sometimes more compactly, at other times more loosely join'd together upon an *Axis-medius*, or *Mid-rib*, and this Cluster of *Flowers*, as I may call them, is called Ἰσλόν in

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the *Greek*, *Julus* and *Amentum* in the *Latin*, *Chaton* in the *French*, and *Katkins* in the *English*. They are either *pendulous* or *hanging downwards*, as in the *Avellana*, *Corylus*, *Nux juglans*, &c. where one, two or three greenish, or herbaceous, small, round Leaves are placed upon a small, short Pedicle, arising from the *Costa-media*, *Axis*, or *Middle-rib*: These Leaves are convex above, and being concave below, cover several little *Stamina*, or rather *Apices*, which compose the *Flowers*; these *Flowers* are thick set and regularly dispos'd upon this *Axis* or *Mid-rib* (which arises from the Branch, and for the most part appears before the Trees are broke, *i. e.* before the Leaves are push'd forth) and hangs so loose, that the least Breath of Wind shall make them shake, of which the ingenious Mr. *Bradly* gives this handsome Account. " This Tree, says he, " *viz.* the *Hazel* or *Philbud*, in *January* " puts forth what are commonly call'd *Kat-* " *kins*, which are long *Thrunbs*, compos'd " of very *small Flowers*, which towards the " beginning of *March* are cover'd with a " fine *Dust*, or *Male-feed*; 'tis then the *Blof-* " *soms* or *Female Parts* appear on the Buds " of the same Tree; they are very small, " and hardly to be discern'd without strict " Enquiry, only offering to the View a small " Cluster of *Scarlet Threads*, which are so " many *Tubes* leading to the *Rudiments* of

“ the *Nuts*: This happens at a windy Season of the Year, that the Male Dust may be the more easily convey'd to the *Utricles*, or *Female Blossoms* of the *Plant*”. There are other *Juli* which are not pendulous, or hanging downwards, but when the new *Stolones* or fresh Shoots of the *Tree*, v. g. in the *Firr* and *Pine-tree*, do begin to extend and be lengthen'd, then it is that these *Juli* or *Clusters* of thick-set *Flowers*, consisting of fine, small, yellowish *Leaves* of the *Calix* and several *Apices*, do not adhere to a proper *Mid rib*, but are plac'd round the new *Stolones*; these are blown about the middle of *May*, and shed their Dust towards the latter end of that same Month. There was Reason for the *Juli* of the other to hang downwards, to be so much expos'd to the Wind, and to shed their Dust so early, because the Leaves would have afterwards hindred the Dust from falling upon the *Embryones*, and the *Fruit*, is also ripen'd in the same Season; but for the *Firr* and *Pine-trees*, they being Ever-greens, and usually having their *Cones* a Year upon the Tree before it is ripe, there is no need of so early a Season for them, nor to be so ticklishly plac'd as to be shaken with every Wind, nor of such haste to shed the Dust, because their Apples take time to grow. Flowers may be otherwise distinguish'd, according to their Sexes, but we shall leave that, as also the declaring of the Use of this Dust, to another Part.



BOTANICK ESSAYS.



ESSAY II.

Upon the Fruits of Plants.



Fruit is an *annual* Part of a Plant, adhering to, and succeeding the *Flower*, and containing the *Seed*; which when ripe, or come to perfection, falls down of its own accord, if not timely pull'd from the Plant.

Though it be said to be *annual*, yet there are some *Fruits* which will remain two Years upon the Tree, as *Figs*, *Oranges*, *Lemons*, &c. as also the *Pine* and *Firr Apples*; but these singular Examples are no Objections against a general Definition.

Fruits are either *esculent*, *i. e.* when that Substance which surrounds the *Seed* is eatable by Man; though it seldom becomes a convenient Food: They are;

I. *Pomiferous*: And these are such as grow upon *Trees*, which consist of a thick and firm *Parenchyma*, or fleshy Substance, surrounding five *membranous Celluls*, containing so many *Seeds*, as in Apples, properly so called, Pears, &c. or whose *Parenchyma* is loose, spongy and juicy, containing the *Seeds* in the middle, as in Oranges, Lemons, &c. The *Herbaceous Pomiferae* are oblong; larger, as *Pompions*, Gourds, *Melons*, &c. or lesser Apples, as *Cucumbers*; all which have a firm *Parenchymatous* outer, and more spongy, juicy and *cellulous* inner Substance, in which a great many *Seeds* are lodg'd.

To these *Pomiferae* may be added the *Fig*; which although it be a *Fructus sui generis*, yet in regard of its Bigness, Figure, and *Parenchymatous* Substance, not so juicy as the *Bacca*, may as well be class'd among the *Pomiferae* as among any other kind of *Fruit*. This singular *Fruit* contains its Flowers in the middle; as has been observ'd of old by *Cordus*, and more particularly of late by *Mr. de la Hire*, as in the *Memoirs* of the Royal Academy at *Paris*, *an. 1711.* who says, that in the middle of the *Fig* there are a great many *pentaphyllous* or *tetraphyllous Calices*, which
arise

arise from the insides of the *Fruit*, and are endow'd with a great many *Stamina* and *Apices*, with the *Pistillum* or *Stylus* in the middle, to which succeed several small *Seeds*.

2. *Bacciferae*: The *Berries* are distinguished from the *Apples*: 1. In their Bigness; the *Berries* being much less than the other: 2. They are of a more lax Texture, and more juicy, having their *Seed* not lodg'd into distinct *Celluls*, as most of the *Pomiferae* are, but dispos'd indifferently amidst the inner *Pulp*, as in the *Grapes*, *Gooseberries*, *Currants*, &c. which grow upon Shrubs; for the Vine can be reckoned no other, unless by its high Ascent, by means of the *Clavicula* or *Climbers*, by which it grasps Trees, Poles, or what else is next to it: There are also *Bacciferous Trees*, such as the *Morus*, *Myrtus*, *Laurus*, *Sambucus*, &c. and *Bacciferous Herbs*; and these are *Magis Sparsi*, as in the *Asparagus*, *Solanum*, &c. or *Coacervati*, as *Arum*, *Dracontium*, though Mr. Ray is pleas'd to class both together, under one and the same *Title*; they may also be said to be *aggregate*, as in the *Morus* and the *Rubus*, when a great many small *Globules* join'd together make up a *Fruit*. There are also *Berries* of a more dry Substance, as the *Baccæ Juniperi* and *Oxyacanthæ* or *Hawthorn Berries*.

3. *Testaceæ* or *Stone Fruit*: These are such whose external Substance is *Parenchymatous*;

in

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in some more firm, as *Apricocks*, *Peaches*, &c. others longer and more juicy, as the *Plumbs* of all sorts; and others more round and less, as *Cherries*, &c. all these have a hard Stone in the middle, containing one single Kernel or Seed. These Stones consist of two equal Portions so firmly united, that no Art can separate them without breaking the Shell; but when put into the Ground, the Seed or Kernel begins to swell, and to be dilated, in due time, by which the two sides of the Stone are forc'd from each other, and the Seed is thus freed from its *Clastrum* or Prison.

With the Stone Fruit may also be reckoned the *Nucifera*, or *Nut-bearing Trees*, some of which are covered with a thick, smooth, outer Rind, and hard Shell, as the *Walnut*; others with a rough one, but *membranous* Shell, as *Chest-nut*; and others have a hard Shell, and *membranous* outer Husk, as the *Avellana* and *Corylus*, the *Filbud* and *Hazel-nuts*.

I come next to the *Fructus non Esculentis*, the not-eatible Fruit; but before I consider them, I shall take notice of the *Seeds*.

A *Seed* is that part of a *Plant*, which when committed to the Ground, or fix'd in any other convenient Place, it is enlivened, takes Root, by which it receives Nourishment, and produces a new *Plant*, like unto that from whence it came; for as Earth is said to

Be pleas'd ^{be} to inform me, Who are they
That bury alive some hundreds in a day.
Ans^r. Gardiners & Plowmen.

be the Mother of us all, so it is such in a special manner to the Seeds of Plants; which can make no Step or Progress towards the Propagation of the Species, until being buried in the Ground it there dies, and a new Plant takes Life as it were, or lends forth its *Fibres* on purpose to receive a competent Supply of Nourishment, and so propagates the Species: For as we are told in *Genesis*, that the *Herb bears Fruit whose Seed is in it self*, so St. Paul tells us in the *Corinthians*, that the Seed which is sown must die, before the Plant to be produc'd by it can take Life, *but God, says he, giveth it a Body as it hath pleased him, to every Seed his own Body.*

There are the *Seeds* of some *Trees*, which falling in betwixt the Clefts of a *Rock* where there is scarce any Earth, the Tree will there take root and grow; and I have observ'd how the *Viscum* will not take root in the Ground, but by the placing of its *Berry* upon some other Tree, it grows, and is propagated there: But be that how it will, the Earth, either mediately or immediately, furnishes Nourishment to all kinds of Vegetables. It may be said indeed, that the *Lithophytæ* do not receive their Nourishment from the *Earth*, but from *Rocks* and *Stones*; but it can be answered, that even the *Rocks* and *Stones* are *Earth* to such Plants in that respect; and to several other *Sub-marine Vegetables* of a softer Texture than they are.

The

The *Seeds* of Plants are either *Nuda* or *Capsulis inclusa*. Some have a great Difficulty in admitting of those commonly called *Semina Nuda* or *Naked Seeds*; and therefore the *Naked Seeds* by such are thus defin'd; *viz.* That a *Naked Seed*, properly speaking, is that whose *Seminal Leaves* are only covered with a proper or a single Coat, and no more, according to that of *Cæsalpinus*, "That in all *Seeds* there is a certain
 " fertile Humour or Substance, which if it
 " perish, or by Age or any other Accident
 " it is render'd fruitless, no Plant can be propagated from it: Therefore to prevent
 " such Inconveniencies, Nature has provided
 " each Seed with its proper Coat, with
 " which it's constantly involv'd till it begin
 " to *Bud*." That it's necessary that every *Seed* should be endow'd with its proper Coat is what shall not be deny'd; but why, because it has another loose Coat still to preserve the *Germen* of the *Seed* from external Injuries, it should not be called *naked* I see no reason; *v. g.* *Pease* and *Beans* are *Capsulis* or *Siliquis inclusa*, yet every one of them have an outer and inner Coat; and because of that, shall not these be call'd *Naked Seeds*? That's going a little too nicely to work: though I think Mr. *Ray* is too much upon the Reverse, when he says, that he accepts of the

whole *Fruit* for a *Naked Seed*. *Tournefort* says, he distinguishes betwixt the *Shell*, and the *Seed* contain'd within the *Shell*. "But, says Mr. *Ray*, "if no *Seed* can be look'd upon as naked, except that which has a single, yea, a double *Coat*, there is no such thing upon *Earth* as a *Naked Seed*^b". Now that there are *Naked Seeds*, which have only one *Coat* from the *Frumenta* or eatable Grains, as *Wheat*, *Barly*, *Rye*, is plain, unless you'll call the *Gluma* the *Chaff* a *Capsula*, and we know that *Barly* has but little of that: again, I am willing to admit of all the *Umbelliferæ* having *Naked Seeds*, though *Tournefort* says of some of them, that they have *Semina involucri deponentia*; but I will not so easily accept of the *Agrimonia* and *Circea*, as having *Semina Nuda*, even although with Mr. *Ray* they be class'd among the Plants *Seminibus Nudis Solitariis*, whereas he owns, that *Agrimonia* has *Vascula Lappacea*, duo semina plerumque continentia: now in this Case, *Agrimonia* can neither be said to have a solitary naked Seed, nor one single Seed to succeed to each single Flower. *Morison* in his *Hist.* and *Hallucinationes*, would have *Circea* and it class'd together, because they have *Semina Verrucosa*: he means, they have a rough *Capsula*; and *Flora Batava* reckons the *Circea*

^b Ray Meth. Emend. p. 126.

among the the *Angiospermæ*, and the *Agrimonia* among the *Monocarpæ*^c; so that with respect to the Fruit both may be class'd together, but none of them can enter among the *Semina Nuda solitaria ad singulos Flores*: Some of the *Trifoils*, as *Trifol. Pratense Purpureum*, are *Monospermæ*; but it is look'd upon as a *Capsular* Fruit, as are all the other *Trifoils*, *Lotus*, *Melilotus*, *Medica*, &c. and although both *Fruit* and *Seed* fall together, yet such *Trifoils* as are *Monosperma*, cannot be said to have a *naked Seed*, according to that of *Rivinus*, speaking of *Fumaria*, "And
 " indeed, says he, its *Seed* may seem to be na-
 " ked, because it does not throw off its Cover
 " of its own accord, although it be very ripe
 " when it falls; as the *Melilotus minima fructu*
 " *renalis seu reniformis nigro*, is not said to
 " have a *naked Seed*, although after the same
 " manner the *Seed* falls down with the *Husk*;
 " so that here they do not err, who strictly
 " examining the *Fumaria*, shall reckon it a-
 " mong the *Siliquous Plants*, when each sin-
 " gle *Silicula* contains a single *Seed*^d." And
 Mr. Ray,

^c Ex *Circis* & *Agrimoniis* peculiare genus componi nempe unicusulare dyspermum & generi plantarum unicusularium subjungi non videtur adeo incongruum. *Flora Batav.* p. 206.

^d Et sanè semen fumarie plerisque videbitur nudum ideo, quia suum sponte non exiit involucrium quamquam satis maturum decidat. Quemadmodum verò *Melilotus*, e.g. *Minima fructu renali nigro* non dicitur semina gestare nuda quamvis eodem modo suum cum integumento demittat semen

Mr. Ray, in his *Methodus Emendata*, says of *Malva*, That in his *Nova Methodus*, and in his *History of Plants*, he had clafs'd it with the *Gymno-Polyspermæ*, or those Plants which have many naked *Seeds* together, not through Ignorance, because he took the *Seed Vessel* for the *Seed*, as *Tournefort* alledges; "for I know, says he, that *Cæsalpinus* attributes a single *Husk* to each single *Seed* of the *Malva*, and by that distinguishes them from naked *Seeds*, as appears from the *Synopsis* of *Cæsalpinus*, his *Method* annex'd to the *Nova Methodus*; but that which Mr. Ray reckoned for a naked *Seed*, whatever, when ripe, naturally falls off from the common Mother or *Placenta* separately, and that along with the *Capsula* or *Husk*: But although in this respect it agrees with the *Gymnospermæ* or naked *Seeds*, yet because of the Figure of the *Flower*, and its *Pistillum*, and that the *Seeds* themselves are easily depriv'd of the *outer Coat*; as also since it agrees by its emollient Virtue with the *Alcea Indica*, he thinks it should not be separated from it." In a word, though

men ita & hoc in loco non aberrabit qui rigorosius examina unicus illam annumerabit filiculosis quæ singula semina singulis inclusis filiculis gestat.

* Hanc plantam (malvæ scil.) in methodo meâ & historiâ plantarum plantis gymnospermis polyspermis accensusi, non quod per ignorantiam capsulam pro grano haberem, ut existimat Tournefortius; novi benè Cæsalpinum malvarum seminibus singulis singulos folliculos tribuere, & a feminibus nu-

though I should be unwilling to deny such as have formerly been receiv'd for *naked Seeds*, to be class'd among the *Gymnosperme*, in order to avoid Confusion, yet I do not think those who have a *Capsula* or *Siliqua*, should, without sufficient ground, be admitted among the *naked Seeds*, when the contrary is plain, and when by so doing, such and such a *Species* must needs be separated from its *Congeners*, which are *Capsular*, as in the former Examples of the *Trefoils* and *Melilotes*, as also the *Malva's*, whose *Capsulae* are very plain.

Vasculum Seminale or *a Seed Vessel*, is either called *Capsula* or *Siliqua*. These are often us'd reciprocally to signify the same thing; but in my Opinion they signify two different things, or at least a *Siliqua* may be called a *Capsula*; but there are *Capsulae* which are not *Siliquae*. Both are otherways term'd; *Vasculum Seminale*, *Conceptaculum* and *Involucrum Seminale*, or *Seminis Folliculus*, *Theca*, &c.

dis ea distinguere, ut patet ex synopsi methodi Cæsalpinianæ quam methodo meæ stirpium novæ, 1682 editæ subjunxi; sed quod pro seminibus nudis habuerim quæcunque per maturitatem a matribus suis singulatim sponte separantur & abcedunt, ut alibi latius exposui. Verum quamvis hoc respectu cum plantis gymnospermis convenit, quoniam tamen floris formâ, ejusque pistillo, & seminibus ipsis, exteriori integumento, & foliis, totiusque plantæ habitu, quin & vi emolliente cum *Altra Indica* convenit, minimè ab eâ separandum agnosco, secundum regulam nihilmet ipsi & aliis præscriptam. Rati Meth. Emend. p. 86.

I there-

I therefore look upon *Tournefort's* Definition of a *Capsula* to be too general, when he says, it's a *Theca* or *Cover* to the *Seed*, whether it be gross or small, hard or soft. I rather take a *Capsula* to be a *membranous*, *short* or *round Vessel*, containing the *Seed* till 'tis ripe; and either opening of its own accord, and shedding the *Seeds*, as *Nicotiana*, *Hyoscyamus*, *Antirrhinum* *Delphinium*, *Scrophularia*, &c. or carried along with the *Seed* it self, as we have observ'd in the *Fruit* of the *Malva*; and these are either *Singulares*, or when one *Capsula* succeeds to each *Flower*, as in the foregoing Examples; or in *Capitulum Congestæ*, as *Aquilegia*, *Helleborus niger*, *Caltha palustris*, &c.

The *Capsulae* are considered, 1. In respect of their *Structure*; in which case they are either *Simple* or *Compound*.

The *simple Capsulae* are those which have one *Cavity*, in which the *Seeds* are contain'd, as in the *Caryophyllus*, *Lychnis*, and all the *Flores Caryophyllæi* of *Tournefort*, *Primula veris*, *Auricula Ursi*, *Anagallis*, &c.

The *Capsulae compositæ* are distinguished according to the Number of the *Loculamenta* or *Pouches*; thus they are *Bicapsulares* or in *duo Loculamenta divisi*, as *Lyfimachia*, *Sedum bicornè*, *Verbascum*, *Blattaria*, &c. *Tricapsulares*, as *Lilium*, *Tulipa*, *Iris*, and all that *Class* of the *Flores Liliacei* of *Tournefort*, *Tetra-capsulares*, or divided into four

Pouches, as *Ruta*, *Stramonia*. This *Ruta* is justly observ'd in the *Flora Batava*, to be *interdum Quinqucapsularis*, as *Geranii Species*, each of which contain only one single *Seed*; and therefore may be said to have *Semina Nuda*, as well as *Agrimonia*. There are other *Pentacapsular Plants*, whose *Pouches*, containing several *Seeds*, open with an *Elasticity*, and disperse the *Seeds* with force, as *Balsamina Famina*, *Trifolium Acetosum*; *Ketmia* also, though it have a mallow Flower, may be justly reckoned among these *Multicapsulares*, as well as *Aristolochia*. I do not incline, as others do, to reckon the *Papaver* among these, because it has several *Placentæ* or *Lamellæ*, in which (running longitudinally) the *Seeds* are lodg'd; but they are not distinct *Loculamenta* or *Pouches*, and therefore *Papaver* is only an *Unicapsular Plant*. Several of these *Multicapsulares* may also be called *Multisiliquæ*, as having several distinct *Pouches* or *Pods*, not separated from each other by a *Septum intermedium*, but are plainly *Bivalves*, as most of the *Siliquæ* are, each consisting of a proper membranous Coat, and opening longitudinally; and these being in *Capitulum Congestæ*, as has been already observ'd, may either be *Multisiliquæ* or *Multicapsulares*, as *Sedum*, *Aquilegia*, *Helleborus*, *Pæonia*, &c.

2. *Capsulæ* may be considered in relation to their *Substance*; in which respect they may

may be divided into *Carnosæ*; as the *Pomifera* and *Membranaceæ*; but this Distinction can scarcely be admitted, because however the *Capsular* Fruit may be called *Parenchymatous*, yet the *Capsulæ* are still *Membranaceous*, consisting of firm, hard, tough, membranous Sides, capable to support the heavy Load of *Parenchyma* or fleshy Substance, in which they are lodg'd, and which rest upon them.

3. In respect of the Number of Seeds they contain; as *Capsulæ Monospermæ*, having only one Seed, as in some or most of the *Trifolius*; *Dispermæ* as *Agrimonia*; *Tetraspermæ*, or *Gymno-Tetraspermæ* of the *Flora Batava*; as in the *Labiata*, such as *Lavendula*, *Hyssopus*, *Salvia*, &c. and *Asperifolia*, as *Borrago*, *Buglossum*: And here it may justly be questioned, whether these may be called *Capsula's*, or only *Vascula seminalia*, because I look upon a *Capsula* to be close shut up till the Seed is ripe; and here the Vessel is always open, though *Tournefort* is pleas'd to call these *Capsulæ quæ Floris calices fuerunt*: And *Polyspermæ*, when there are many Seeds contain'd in one *Capsula*, whose Number is indefinite.

The *Capsulæ* have belonging to them the *Septa intermedia*, and the *Placentæ*. The *Septa intermedia*, are as it were *partition Walls*, running from the one side to the other, and dividing the *Capsula* into several

Apartments, called *Loculamenta* or *Pouches*; and upon that account it is that they are called *Bicapsulares*, *Tricapsulares*, &c.

The *Placentæ* are certain Substances to which the Seeds adhere, and from whence they receive their Nourishment: Sometimes they arise from an *Axis medius*, or an *Axle-tree*, (called by the *French Pivot*,) fram'd by the Conjunction of the three *Septa*, which meet in the *Center*; and to this *Axis* is fix'd the *Placenta*, which occupying the middle Cavity of each of the *Loculamenta*, is there loaded with Seeds on all sides, as in the *Campanula*. Each of these *Loculamenta* open either at the top or *longitudinally*, as the *Seeds* ripen, and separate from the proper *Placentæ* or *Seed-beds*. Sometimes the *Placenta* occupies the *Center* of the *Unicapsular* Fruits; and these generally open transversely when the *Seeds* quit their hold, and are ripe, as in the *Anagallis*; and sometimes they arise from the sides of the *Capsula*, and run towards the *Middle*; but not meeting in the *Center* they are only *Unicapsular*, as in the *Papaver*; though the *Flora Batava* calls it *Multicapsular*, because of the several longitudinal *Lamellæ*, to both sides of which the Seeds adhere, and are pour'd out, when ripe, at so many Holes at the top, (covered with an *Operculum* or *Lid*,) as there are *Intersections* by the *Lamellæ*, which scarce happens to any other *Unicapsular Fruit*; upon which account

I sup-

I suppose it is, that *Herman* did not think it fit to reckon it among the *Unicapsulares*.

I next consider the *Siliquæ* or *Pods*. These are long, round, or flat *Seed Vessels*, each containing one or two Rows of Seeds; some are *Bivalves*, i. e. divided longitudinally into two Parts, opening at the one or fore-side, and having the *Seeds* adherent to the other, as in the *Chelidonium majus* and *Glaucium*, or *Papaver Corniculatum*; wherefore I think they ought to be disjoin'd from the other *Papavers*, notwithstanding of the *Perrantibium Bifolium*; others are *Univalves*, as *Clematis Daphnoides*; Some are *Lanuginosæ*, as *Aselepias*, *Acocinium*; and others *Tetracapsular*, and *Quadrivalves*, as *Chamenerion*, &c. Most of that Genus of Plants called *Flore Cruciformi donatæ* of *Tournefort*, and the *Tetrapetalæ* of other Authors, are either *Siliquosæ* or *Siliculosæ*; and all the *Leguminosæ*, or *Flore Papillonaceo donatæ* are *Siliquosæ*.

The *Siliquæ* are likewise considered as to their *Articulations*; so they are either *Siliquis planis* or *Articulatis*, as *Rapissrum siliqua plana*, and *Siliqua Articulata*: Also among the *Papillonaceous Flowers*, there is *Pisum* with a *Siliqua Plana tumida*, *Phaseoli Siliqua Compressa*; *Ornithopodium*, *Orobis*, *Siliqua Articulata*.

N. B. *Articulus* in Botany signifies several Joints or Knots, by which one part of the

Pod is distinguish'd from another, as if they had been formerly join'd together, as in *Securidaca*.

There are likewise *Siliquæ Cochleatæ* and *Falcatæ*, as the *Medicas*. These are seldom or never called *Capsulæ* but *Siliquæ*, because of their being *Bivalves*.

I may also reckon among the Fruits, the *Capita* or Heads of the Plants, because they contain a great many *Seeds* within one *Theca* or Cover; such as the *Capitatæ*, as *Carduus*, *Cinara*, *Jacea*. These having a *Pappo* or Down, are called *Papposæ*. The *Corymbiferæ*, which are *non Papposæ sed seminibus solidis*; and these are either *Nudæ*, as *Tanacetum*, *Absynthium*, *Abrotanum*, &c. called by Tournefort *Flore Flosculo* *Corymbiferæ Radiatæ*, as *Calendula Bellis Flore Semiflosculo*; *Papposæ*, as *Hieracium*, *Dens Leonis*, *Tragopogon*, &c. *Non Papposæ*, as *Cichoreum*, *Endivia*, &c.

A *Pappo* or Down is a soft Substance, consisting of a great many small *Villi*, or Hairs, join'd together, contain'd in the Head or Fruit of a Plant, sometimes separated from the *Seeds*, as in the *Hips* of the *Roses*, and in all the *Capitatæ*, as *Carduus Cyanus*; and sometimes it is adherent to the *Seeds* themselves, as in *Tragopogon*, *Dens Leonis*, for which they may be called *Semina Alata*, to be distinguish'd from the *Semen Barbatum* of the *Carduus Benedictus*.




BOTANICK ESSAYS.



ESSAY III.

Of the different Methods of disposing Plants.

 O distribute or dispose of Plants into a *Method*, is to rank or *Class* them, as Dr. Morison justly expresses it, according to their *Cognationes & Affinitates*, i. e. when upon strict Observance of the several Parts of the *Plant*, they find that one, two, or more of their most *essential Parts* agree together in their *Notes* and *Characters*, and that these *Notes* do not vary, but are unchangeable in all Plants
rais'd

rais'd from the same Seed, or sprung up from the same Root.

Before I attempt to consider that *Method* it self, and its several Distributions, according to the different Authors, I shall first shew what a *Note* is.

A *Note* is two-fold, either *Characteristick* or *Distinctive*. A *Characteristick Note* is a certain constituent part of the *Plant*, which never alters, but is so fix'd, that all other *Plants* which have that part of such a Frame, or such a Figure, situated so and so, and dispos'd after such a manner, may be justly class'd together, *v g.* The *Characteristick* of an *Umbelliferous Plant*, is to have a small *Pentapetalous Flower*, to which succeed two Seeds firmly united together when green, and easily separating from each other when ripe; and all *Plants* (however their *Flower* may be dispos'd upon the top of the Stalk and Branches, and whatever be the Figure of their *Leaf*) that have these Characters of the *Flower* and *Fruit*, are still *Umbelliferous*: For if the Disposition of the *Flower* were requir'd, then the *Tanacetum*, which is a *Corymbiferous Hedera Arborea*, *Sambucus*, *Ebulus*, which are *Bacciferous*, would be *Umbelliferous*, *Plants* also, because all of them have several small *Pedicles* arising from them, and situated upon the top of the common *Stalk* and *Branches*: *Quadam veluti circinatione Corymbi vel Umbellæ (qua Mulieres*

Mulieres solem à Vultu arcere solent) ad-
instar dispositæ. " dispos'd in a Circle, mak-
 " ing the Figure of an *Umbrella*, which Wo-
 " men carry above their Head to guard their
 " Faces from the Heat of the Sun, or in a rainy
 " Day. Neither is it because they have *Folia*
Lobata, *Pinnata*, or *Plurifariam divisa*, for
 several other Plants are so too. The *Characte-*
ristical Note of a *Planta Spicata* & *Verti-*
cillata is, that it have either a *Helmet*, or *Lip-*
flower, and four *Seeds* to succeed each of them.
Euphrasia may be call'd a *Planta Spicata*, by
 the *Disposition* of the *Flower*, and a *Planta*
Labiata, because of its *Figure*; but it can-
 not be join'd in with the other, because it
 has a *Capsular Fruit*; *Borrago* and *Buglos-*
sum have four *Seeds* to each *Flower*, but it
 cannot be join'd with the *Verticillata*, be-
 cause their *Leaves* are dispos'd in *Pairs*,
 and the *Leaves* of these are *alternately plac'd*.
 Their *Flowers* have *unequal*, but the *Flowers*
 of These have *equal*, *Segments*.

A *Distinctive Note*, is that by which two
 Plants, having the same *Characteristical Notes*,
 are distinguish'd from each other, v. g. *Meum*
 and *Feniculum* agree, in their being *Umbel-*
liferous Plants, with fine deep cut, dark
 green *Leaves*, and a long *striated Seed*;
 but their *distinctive Note* is, that *Feniculum*
 grows much higher, has *longer Segments*, yet-

lovisch Petala, bending upwards; *Meum* has a *perennial*, (most of the *Fennels* are annual, or *biennial*) bearded *Root*; *Bupleurum* and *Perfoliata*, have undivided *Leaves*, in which with the other *Characteristicks* they agree; but their *Distinctive Note* is, that the *Stalk perforates the Leaf* of the *Perfoliata*: *Libanotis*, and *Laserpitium* agree in all their *Characters*, having the same *Flower dispos'd* after the same manner, with the same *semina Rotæ molendinariæ forma*, as Dr. *Morrison* justly compares them. But their *Distinctive Note* is, that *Libanotis* has *Folia Lobata*, and *Laserpitium Folia plurifariam divisa*.

Knautius lays down this general Rule for constituting the *Characteristicks* of *Plants*, viz. Whatever *Plants* have *Flowers* after the same manner, and produce *Seed-Vessels* conform to the *Flowers*, these belong to the same *Genus*, and ought to be design'd by the same *Name*. Thus the *Malva Betonicæ folio* is a *Mallow* by the *Flower*; but its *Fruit*, consisting of several *capsulæ in capitulum congestæ*, according to Dr. *Tournefort*, it is therefore a distinct *Genus* which he calls *Malacoides*; *Alcea Arborescens* has a *Mallow flower*, but by its having a different *Fruit* divided into several *Loculamenta* or *Pouches*, is deservedly a distinct *Genus*, which *Tournefort* calls *Ketmia*.

Of the different Methods, &c. 61

The celebrated Mr. Ray lays down the following general Rules for constituting a *Method*.

- “ 1. So few Innovations as possible are to be made. The Names of Plants generally receiv’d, frequently us’d in the Writings of Physicians, are not to be chang’d but upon good Grounds, to avoid Confusion.
- “ 2. The *Characteristick Notes* of the *principal*, as well as the *subaltern Genera*, are to be distinct, clearly, and exactly defin’d, not obscure and indeterminated, whose Signification is uncertain how far it may be extended.
- “ 3. That the *Characteristick Notes* be *manifest, obvious, and easily discernible*.
- “ 4. Care is to be taken that the *Congeners*, and these in *Affinity* with them, be not separated; and that Strangers, and such as do not agree in the Notes, be not introduc’d into the *Family*.
- “ 5. That no more *Characteristick Notes* than what is necessary be admitted, and that no more be requir’d than what is sufficient to determinate a *Genus*, lest the Memory be over-charg’d, and that instead of *Characteristick Notes*, a Discription of the whole *Plant* be given.

Things being thus premis’d, we are to consider what are the Parts of the Plant which are
most

most convenient for establishing the *Characteristick Notes*, and how many of them are to be join'd together, in order to constitute a *Genus*.

As to the Parts of the Plants, no doubt the most certain, and such as are least subject to Variation or Changes, are only they which ought to be admitted for *Characteristicks*; and these ought to be the most obvious, and most conducive for the *Preservation* and *Propagation* of the *Species*; Therefore the *Flower* as the most obvious, The *Fruit* as most conducive for the *Preservation*, and the *Seed* as the Instruments of *Propagating* the *Species*, are the three, which in my Opinion ought more-especially to be regarded. Not that I would have the *Root* and *Leaf* to be neglected, only they ought to amount to no more than *Distinctive*, but not *Characteristick Notes*. Thus we have *Iris Bulbosâ*, and *Iris Tuberosâ Radice*: They are both *Irides* by the *Flower* and *Fruit*, though they differ in the *Root*. *Rubia*, and its Congeners would be still class'd together by their *Monopetalous Flower*, deeply divided into four *Segments*, and two succeeding *Seeds*, though the *Leaves* were not dispos'd like the *Points* of a *Star*, by which they are called *Stellate*; for *Cruciata*, and *Gallium Album*, are as much *Radiate* or *Stellate Plants*, though they have but four *Leaves*, which proceed from the *Stalk*, as they which have six or eight.

right. *Consolida* and *Cynoglossum*, are as distinct from the *verticillate* and *spiked* kind, by their *Flowers*, as by their *Leaf*; and should a Plant be found with the same kind of Flower preceding four *Seeds*, it might be join'd in with them, though the *Leaves* were neither rough, nor alternatively plac'd.

So that I am much of *Tournefort's* Opinion in that Case, that two or three Parts may be join'd together to make up a *Genus*, but no more, whereof the *Flower* and the *Fruit*, or either of these join'd with one or two of the other Parts of the Plant, ought to make up the *Character*, v. g. The *Flower-fruit* and *Bulbous Root* can make up the *Iris Bulbosa*, or *Xiphion*, though the *Grass Leaf* were wanting; but if a Plant had a *Bulbous Root*, a *Grass Leaf*, and a *Tricapsular Fruit*, it would not make up a *Xiphion* or *Iris* without the *Flower*, neither could it well be call'd an *Iris*, if it had either a *Pod*, or were *Unicapsular*, though it had the other three *Generical Parts*.

Indeed the *Root* and *Leaf* are very good Auxiliaries, but then they are so variable in most of the *Genera*, that they can never serve to constitute the *Class* without the assistance of other more essential Parts, v. g. A *Bulbous Root* is a very good Mark of *Distinction*, and when it meets with an *Hexapetalous*, or *Monapetalous Flower*, divided into six *Segments*, as in the *Iris*, *Lillies*, &c. When

too it has a *Grass Leaf*, as the *Allium*, *Cæpa*, *Porrum*, &c. Then with the *Flower Seed*, and *Seed Vessel*, it may serve to make up a *Class*, which without them it cannot do; for if we should add all the *Bulbous Roots* together, then several other *Plants* would be *displac'd* from their *Genera*, and after all make up but an uncertain *Class*. The *Bulbous root-ed Cræfoot* would be a Stranger here, for though it has a Claim to come in by the *Root*, yet because of most of its other Parts, it cannot be admitted. *Iris Vulgaris*, *Asphodelus Palustris*, *Arum*, and the *Orchides*, I see not how they can be *Affines* or ally'd to the *Bulbous Roots*, when they have not the least Claim to be of Kindred to one another; for there's none of them that has any Pretence to be nearly related to any of the *Bulbous Class*, unless it be that the *Iris* be of kin to the *Xiphion*. *Asphodelus Palustris* has a Leaf like to the *Iris*, but that's nothing to a *Bulbous Root*; and beside the *Root* of this *Asphodelus* is rather *Fibrous* than *Bulbous*, and what Relation has *Arum* to any of these; by its Flower it resembles the *Aristolochia*, if any; by its Fruit, it comes in among the *Bacciferae*, and nothing but its *knotted Root* can bring it in with the *Bulbosis Affines*. The *Flowers* of the *Orchides* vary much, their Fruit resembles the *Bulbous Class* in nothing but having three Holes to shed forth its Seeds (if that can be call'd a Resemblance) for 'tis for the
most

most part *Unicapsular*; and if a *Note* were to be taken from its Root, that would be hidden and not obvious, for you must dig them up in several Species, before it can be known whether it be *Radice Palmatâ*, or *Testiculatâ*, and if these *Bulbosis Affines* were admitted to make a *Class* of *Plants*, then they would bring in Discord and Confusion among other *Genera*. How well do all the Species of the *Scrophularia* agree together? But if they shall be respected according to the *Root*, then there happens a Division in the *Family*; for *Betonica Aquat.* must be sent a packing, because of its *Fibrous Root*, in Contradiction to the other Species of *Scrophularia*, whose Roots are *knotted*. Nor can it be receiv'd with any other, for it has but a slender Pretence to be join'd with *Betonica*, because of a small Resemblance in the Leaf, so that the *Bulbosis Affines* may be let alone for a *Class*.

The *Classing* by the *Leaf* is as uncertain. I have already shewn how fallible those two Cardinal *Genera*, the *Asperifoliae* and *Stellatae* may prove, and if these are scarce to be admitted, much less any other. Should all these who have undivided Leaves be join'd together, what a Confusion would that make? *Ranunculus Gramineus*, and *Plantaginis Folia* would be sent off and join'd with the *Plantago aquat. major* and *minor*, which though they be by some reckon'd *Ranunculi*, yet they differ from the other, especially

in the *Tripetalous* Flower. *Papaver Hortense* would be separated from the *Papaveres Erratici* and *Argemone's*, because it has a whole, and they deeply divided Leaves, and so in a great many others. If they are to be class'd according to the Disposition of the Leaf, then *Hypericon* might be join'd with the *Plantæ Flore Labiato* of *Tournefort*, because both of them send forth their Leaves by Pairs, and several of the *Umbelliferæ* might be join'd with the *Asperifoliæ*, because their Leaves are alternatively plac'd, &c.

So likewise the Disposition of the *Flower* is uncertain. I have shewn that its not because several little *Pentapetalous Flowers* are dispo'd in a Circle upon the top of the *Stalk* and *Branches*, that a Plant is *Umbelliferous*; for then would *Perfoliata*, *Sanicula*, *Eryngium* be dis-join'd from the *Umbelliferæ*, and so would *Hydrocotyle* of *Tournefort*; but if two Seeds, succeeding to each small *Pentapetalous Flower* are to be admitted as *Characteristick*, as they are by the common consent of all Authors, especially if several of them be join'd in a *Capitulum*, whether with or without Pedicles, then they have the *Flores Circinato dispositi*, and *Pediculis donati*, and the *Folia Lobata*, *Plurifariam* and *Multifariam divisa*, and *Fœniculacea*, all which were much look'd after in former Times among the *Umbelliferæ*.

Nor

Nor are the *Corymbiferous Plants* a more certain *Class*, because of their Disposition in *Corymbum*, like the *Baccæ Hederae*, for at that rate none would be reckoned a *Corymbiferous Plant*, except *Tanacetum*, *Millefolium*, *Helichrysum*, and some others; but when by a *Corymbiferous Plant* is meant a *Floscular* or *naked Flower*, consisting of a great many small *Flourishes*, to each of which succeeds a *solid*, not *pappous Seed*, or a *Radiate Flower*, whose *Corona* or *Radius* consists of half *Flourishes*, and *Discus*, *Umbo*, or *middle part* of the *Flower* has *Flourishes*, and a *solid*, not *pappous Seed*; then that *Class* is determined, whether the *Flowers* are all plac'd upon the top of the *Stalk*, or only proceed from the *Spikes* of the upper part of the *Stalk*, as *Absynthium*, *Abrotanum Mas*, *Artemisia*, &c. 'tis all the same. And here the *Division* of the *Leaf* would serve to no purpose; for I look upon *Balsamita Mas*, call'd by *Casspar* and *Johannes Bauhinus*, *Mentha Corymbifera*, as a *Tanacetum*, though the one has a *divided*, and the other an *undivided Leaf*, since they agree in the *Structure* and *Disposition* of the *Flower* and *Dracunculus hort.* five *Trachon.* *J. B.* to be an *Abrotanum* for the same Reason. It is difficult to determine wherein the Distinction betwixt *Absynthium*, *Abrotanum* and *Artemisia* lies, though they are truly distinct *Genera*, having the same *Flower*, and

dispos'd after the same manner too ; and yet Dr. *Tournefort* seems to have been in the right to join the *Trachon* to the *Abrotanum*, rather than to any of the other two.

Mr. *Ray* expresses himself handsomely on this account : “ He justly owns, that it’s
 “ most difficult to distinguish *Absynthium*
 “ from *Abrotanum*, by certain and proper
 “ Notes, which are competent to all the
 “ Species *Absynthii*, and to none of the *A-*
 “ *brotana* ; for 1. It is not the excessive Bit-
 “ terness which is peculiar to several of the
 “ *Absynthia* that will do it ; for there is an
 “ *Absynthium inspidum*, and there are several
 “ of the *Abrotana* that are as much
 “ bitter as the *Absynthia*. It’s not, 2. the
 “ whitish Colour of the Leaf, for there are
 “ some *Abrotana* which have whitish Leaves,
 “ as *Abrotanum mas*, *Augusti folium mas* : B.
 “ Nor 3. the woodiness of the Stalk, which
 “ is more peculiar to the *Abrotanum*, for
 “ there are also some Species of the *Absyn-*
 “ *thium* which are woody, as *Absynthium*
 “ *Arborescens*, *Lob.* Neither is it 4. the
 “ the Division of the Leaf into larger and
 “ less Segments, for there are Species of
 “ both which have very small Segments,
 “ and finely divided (though this is not re-
 “ ciprocal, for none of the *Abrotana* have
 “ their Segments so large as the *Absynthium*
 “ *vulg. Latif*.) Therefore Mr *Ray* observes,
 “ with Dr. *Tournefort*, that there is some-
 “ what

“ what in the Habit of the Plant (*Gallice*
 “ *Le'Port*) by which *Absynthium*, *Abrota-*
 “ *num*, and *Artemisia* are distinguish'd from
 “ each other ^b. *Tournefort* says, *Artemi-*
 “ *sia differt ab Absynthio solâ facie exter-*
 “ *na; nam florum discrimen oculos pene fugi-*
 “ *unt* ^c. I may likewise add, that the *Flo-*
res Penduli, and *Calix Sphæricus* will not do
 to all the *Absynthia*, for *Absynthium Mari-*
num, has erect Flowers, and an oblong *Ca-*
lix, like the *Artemisia*, but there is some-
 what in the *Foliorum Divisura* which can-
 not be express'd, and yet by which 'tis easy
 to distinguish *Artemisia* from its *Congeners*
Absynthia and *Abrotanum mas*. The like is
 also observable in the *Adiantum nigrum of-*
ficinæ, which has some unexpressible *Di-*
visions and *Striæ* in the *Leaf*, by which its
 distinguish'd from some of the *small Filices*
Saxatiles, which it otherwise very much re-
 sembles. *Abrotanum Fœmina*, or *Santolina*,
 is easily distinguishable from its *Congeners*,
 if it were but by a single, large Flower, up-
 on each single Stalk, though Mr. Ray brings
 in Dr. *Tournefort* as using the (*Leport*) *Plan-*
tæ habitus, as a Note to distinguish it from
 the rest.

Mr. Ray brings in the *Corymbiferis Affines*
 and *Capitatæ*, as two distinct Genera from
 the *Corymbiferae*. I would rather chuse with

^b Raii Meth. Emend. p. 37. ^c Turnef. Institut. 460.

Dr. Tournefort to bring them all in among the *Flores Flosculosi*, and then distinguish them by the *Seminibus Papposis* and *non Papposis*. For all of them have the *Flosculi Fistulares*, though the *Scabiosa* and *Cyanus* differ from the other *Flores Flosculi* in the Figure and Equality of their Segments.

I'm not very fond of *Lactescens* as a Characteristick Note, to constitute a Class, for then the *Tithymalls*, *Campanula's*, *Rapuntiums*, &c. might be brought in; and altho' *Pappescens* too be added, that's not sufficient, for then there would be room for the large Genus of the *Apocynum's*, which none will pretend to class with *Hieracium*, *Dens Leonis*, *Sonchus*, &c. So that I think Dr. Tournefort was in the right for joining all the *Flores Semiflosculosi* or Flowers with half Flourishes together, and then he had a good Opportunity to distinguish betwixt those which had *Semina Papposa* and *non Papposa*, for that of *Flore Composito* is too general, and capable of too many Sub-divisions to render the Method of distributing Plants succinct and easy to be understood.

To sum up what has been already said concerning the manner of distributing Plants according to their several Genera and Species, by their Characteristick and Distinctive Notes. As there is a Necessity of joining two, three, or perhaps more of these Notes together, to render the Plants the more intelligible

reliable, and make the Knowledge of them be the more easily acquir'd, so it is most difficult to be determinate which of them are fittest to be receiv'd as *Characteristicks*, and which as *Distinctive*; for in treating of *Plants* now-a-days, *Authors* are not to chuse the easiest *Method* for themselves, in order to make the Description of one Plant follow another, as some do it *Alphabetically*, that they may not be render'd uneasy in assigning to each *Genus* the *Characteristick*, and each *Species* its *Distinctive Note*. Others according to the Seasons of the Year, that they may describe the first *Plant* that comes to hand without Distinction, as *Besslerus* did when he gave those elegant Figures of *Plants* in the *Hortus Eflitensis*, or according to their Virtues, that they may heap up confusedly together, those that are good for such and such a Distemper, whether they be so or not; as *Parkinson* in his *Paradisus Terrestris*, and *Theatrum Botanicum*; or according to the *Facies Externa*, and *Plantæ Habitus*, as *Mathiolum* in his *Commentaries* upon *Dioscorides*. But *Authors* are now to chuse the most intelligible *Method* to teach others (and not to please themselves) by laying down some of the principal Parts of the *Plant* as *Characteristick Notes*, and then dividing and sub-dividing all those which partake of such and such a *Characteristick*, into their several *Genera* and *Species*, according to these call'd *Distinctive*

Notes, v. g. If the *Flower* be *Characteristick*, then the *Fruit* or *Seed-Vessel* and *Seed* must constitute the *Genus*, and the other less material Parts, such as the *Root*, *Stalk* and *Leaf*, must be considered, in order to make up the several *Species* belonging to such a *Genus*. If the *Fruit* or *Seed*, and *Seed-Vessel*, be the *Characteristick*, then the *Flower* and other Parts must be had Recourse to for Distinctions sake; and if the *Root* and *Leaf* be look'd upon as such, then the other Parts of the *Plant* must be subservient to them.

And herein it is that the great Contest among Authors lies, what Number of Parts, and which of them shall be look'd upon as *Characteristick*, &c. every one joining one or more of them together, as their Humours and Fancies lead them, by which they have multiply'd *Methods* so fast in a short Time, that if *Botanick* Writers go on at this rate, e'er it be long they shall render *Plants* as unintelligible by *Method*, because of their great Plurality, as formerly it was to know the *Plants* without *Method*. But would *Authors* from henceforth observe the following Rules, I persuade my self such vast Inconveniencies would be prevented, and that delightful Science of *Botany* would be farther advanc'd. The *Students* of it would not be so much discourag'd, and others might be persuaded to betake themselves to that laudable Study, which carries

carries so much Innocence and Simplicity along with it, which yields so much Pleasure and Satisfaction to those who pry into it, and which affords Matter of so much curious Speculation, that it's pity any such Obstruction should be made to its Progress, by the Mismanagement of those who ought rather to be instrumental in its Propagation.

1. Then it were convenient, that all the Writers upon that Subject would cease to treat one another undecently, by reflecting upon their Knowledge, or accusing them of Unskilfulness, (because they have fail'd in their Observation, and have not come up to that Nicety in describing of a Plant as another) which only serve to raise Disputes, and ~~be a Means of~~ Altercation and Strife, ~~rather than of Search~~
~~into the Truth.~~

2. Since 'tis acknowledg'd by all, that the *Flower, Fruit, Seed* and *Seed Vessel*, are the most essential Parts of the *Plant*; and that there are *Methods* enough already establish'd, into which *Plants* have been dispos'd according to their *Characteristick Notes*; it were convenient that none would give themselves the trouble, or rack their Brains, to find out any new *Method*, wherein to dispose of *Plants*, different from what has been laid down: But, by being sedulous in making ~~new Observations, that they~~ ^{that} would impartially correct and amend what they find amiss in the former *Methods*, by altering the *Titles* ^{all} where

where they find a *Discrepancy*, adding to the *Characteristicks* where there is a real *Deficiency*, and sometimes transposing of *Plants* when they find them misplac'd; but still with a due Deference to the Founder, who should always have the Honour of the Name of the *Method*, because he was at so great Pains to class them first together in such a manner; v. g. Mr. Ray once class'd *Arum* among the *Bulbosis Affines*^d, as has been observ'd; after that he more justly join'd it to the *Baccifera*^e; but since he has plac'd it among the *Fructu magis sparso*, it were convenient to remove it from thence, and with its *Congeners*, *Dracontium*, *Arisarum* and *Colocasia*, make up a new Title, viz. *Baccifera Fructu Aggregato sive Coacervato*, in contra-distinction to the former. Now this may be done without any Prejudice to the *Method*, and yet be of more use to the Reader; for tho' in the *particular Note* of *Arum*, it is said to have *Fructum è baccis Coacervatis*, yet since this is contradictory to the Title, 'tis convenient that such be rectify'd, because Readers often rely upon what is contain'd in the *Title*, without being at pains to examine the *Notes* belonging to each particular *Genus*, and so may be led into a Mistake: So that whether the Design of the *Method* be to class

^d Synopf. Stirp. Brit. p. 234, 235.
& Auct. p. 75.

^e Meth. Emend.

the Plants by the *Flower*, and distinguish them by the *Fruit*, or to class them by the *Fruit*, and distinguish them by the *Flower*, there may be still work enough for the curious *Botanist* to alter the *Titles* of the *Genera* themselves, rectify the *subaltern Genera*, and render the *Characters* of any particular *Plant* more obvious, without prejudice to the *Method* it self, by pulling it down, that another may be built upon its Ruins, or doing what may reflect upon its Author, which I am sorry should be so frequently done.

3. That special Care be had not to invent new Terms of Art, establish new *Genera*, nor deprive any *Plant* of a long-receiv'd Name, upon any trivial Pretence; but what needs must, in order to rectify gross Mistakes: For the unnecessary *Multiplication* of these, is ready to create a Confusion, and puzzle the *Botanick Student*, upon every slight Occasion.

Therefore all Endeavours should be us'd, to find out a proper *Genus*, already established, to which such and such a Plant may be referr'd, and with which it may agree in the Character: And I'm convinc'd, if this were rightly observ'd, there would not be so many *Plantæ sui generis* or *incertæ sedis*, nor so many *anomalous* Plants, as are frequently pointed out to us by Authors.

Having thus premis'd what I thought convenient, to make it be understood what is meant

meant by *Method*, I shall next proceed to give an account of the Origine and Progress of it.

I have already shewn what might have been the Ground-work upon which Dr. *Morison* built his Method, and what might have been the Means of setting him to work, in correcting the Errors of others, and in establishing a new one of his own; which has been a Pattern to all those who have writ upon Method ever since. And I'm sorry to find some, otherwise good, learned, and ingenious Persons, at so much pains, to calumniate, inveigh against, and detract from that great Man, those due Praises he justly deserves; as being the chief Author, I may justly say Founder of so great an Undertaking, as that of the disposing of Plants into a *Method*; and to reflect so much upon his Memory after he was dead, and not able to answer for himself.

I'm likewise much concern'd, that one who by his unfortunate and untimely Death, (which happen'd *non sine insigni Rei Herbariæ jacturâ*, as *Ammannus* justly expresses it⁽¹⁾) has arriv'd at the highest Pitch of *Honour* and *Glo-ry*, by the Improvements he made, and *Correspondence* he has kept with the greatest *Botanists* in *Europe* ever since, should not have rested contented with the *Spolia* of his *Com-*

⁽¹⁾ Amman, Charact. Plant. Genuina. Præf. p. 10.

petitor, but throughout the whole Course of his Life, and even when it may be said, that one of his Feet were in the Grave, and the other following, according to the Proverb, continu'd to rake into his Ashes, and to commemorate his Imperfections (which in a Christian way ought to have been buried in oblivion) after a most barbarous, undecent and inhumane Manner; as is to be seen in the Margin, and which will not bear a Translation §; and all this because *Cesarve priorem Pompeiusve parem.*

Dr. Morison had spent a great deal of his Time in observing of the Plants themselves: by the Encouragement of the Duke of Orleance, his Patron, had bestow'd much Money in procuring a great many foreign and rare Plants; did by indefatigable Pains, Industry and Labour, traverse, search after and obtain, from all the Parts of France, such a Quantity

Morison's
Method.

§ Hac re graviter offensus D. Robertus Morisonus Aberdonensis Scotus M. D. veritus fortasse ne quid famæ suæ & auctoritati (quem non mediocrem inter Botanicos nec immeritò sibi comparaverat) editis speciminibus methodi illius quam se non libris hausisse sed à natura ipsa edoctum fuisse gloriabatur, decederet; inque in messem suam falcem immittere agrè terens, tabulas illas tacito auctoris nomine indignis modis laceravit. Ego quamvis methodum illam reprehensionibus obnoxiam, nec tantum imperfectam sed in multis vitiosam fuisse agnoscerem, cum tamen viderim me ab homine aulicæ sui que pleno ne quid durius dicam aut manes ejus inquietem, contemptum & ludibrio planè habitum, ut existimationi meæ aliquatenus consulere, tentare statui quod naturæ ductum in plantis digerendis & methodo instituendâ possem. Præf. ad Meth. Emend.

of *indigenous* Plants, as to make up a large Catalogue in five Years time, of which there were 260 *non Descripts*. He was also indefatigable in turning over and consulting of ancient Authors, thereby finding out what made for his Purpose, and detecting of their Errors, by which he compos'd those notable *Hallucinationes*, now so much decry'd and enveigh'd against, because of the unusual Title, *Hallucinatio*; though that now so much despis'd Treatise, was the first which gave so much Insight to those who afterwards gain'd so much Fame, and who notwithstanding of what they obtain'd by it, did ever continue in a ridiculous manner to speak against it. Dr. *Morison*, I say, as the effect of so much Labour, did first receive the fore-mentioned Hints from the above-nam'd *Gesner*, *Columna* and *Casalpini*; and by distributing of the Plants, not only according to these Hints, but according to his own repeated Observations, *reviv'd*, *restor'd*, and I may justly say *founded*, that which is called *Method*. And because he justly assumes the Glory of so great a Work to himself, he is revil'd, despis'd, call'd proud, vainglorious, ostentatious^b, &c. and even by those who were much more profited by him, than he was by *Gesner* and *Columna*, so of-

^b Verum cum sibi nimis placeret & alios se doctiores contemneret, majora viribus aggredi & plantarum historiam universalem conscribere ausus, nec famæ suæ consuluit nec aliorum expectationi satisfecit. Præf. ad Hist.

ren thrown in his Face, and so much made use of as a Handle against his Memory; but any impartial Person, who will but take notice of his own Words, and read him in his own Language, will, I'm persuaded, be ready to have a quite different Impression from what is industriously spread against him.

In the Dedication of the *Hortus Blesensis*, to King *Charles II.* he says, “ⁱ That the “ Method is now given by Nature, and by “ him alone (without Vanity) only observ’d, “ discovered by none but himself, although “ it be of an equal Date with the beginning of the World.” This is the Expression which makes all the Noise; and yet if it be look’d to by an impartial Eye, it is not so liable to Exception as others would have it: For let it be own’d, that he built upon the Foundation of others, yet by his correcting of their Errors, clearing up of their Obscurities, and making the whole so plain and obvious, by considerable, not imaginary Alterations, *ex autopsia*, from the exact Observation of the *Plants* themselves; and if the several Distributions of the *Plants*, according to the Foundation, be his own, without the Help and Assistance of any other, may not he justly have call’d all this his own do-

ⁱ Quin & methodum meam novam à natura datam à me solummodo (sine jaëtantiam) observatam à nullo nisi me ipso in hunc usque detectam quamvis mundi incunabilis sit cœva. Hort. Bles. Epist. Dedicat. ad Car. Reg. 2.

ings; and is there any just Reason of reflecting against him for so saying? But hear him farther, as to what he proposes for a Recompence to his Pains; and how propheticall he has prov'd in what he propos'd; "I persuade my self, says he, that your Island of *Britain* (speaking to King *Charles*) shall hereafter have as good reason to glory in the Knowledge of Plants by a most exact *Method*, which is that of Nature it self, as the *Germans*, *French* and *Italians*, were famous for their Knowledge of the *Botany* without a *Method* in the former Age." And what a vast Progress the Knowledge of *Botany* has since made in the Island of *Britain*, by the Means of *Method*, to which he gave the first Example, very well appears at this Day.

The second Part of the Calumny rais'd against him was promoted by a Foreigner¹, viz. that in his *Hallucinationes* he had reflected upon the Authority of so great an Author as *Caspar Baubinus*; as if Error should still be allow'd to continue, and not be spoke against, because of the great Value and

¹ Polliceor Britanniam vestram cum methodo exactissimâ quæ est naturæ ipsius impofterum in re Botanica gloriari posse; quemadmodum Italia, Gallia, Germania, superiori seculo in scientia Botanica sine methodo gloriati sunt.

² Nullam itaque video querelæ causam quam Königius de Regno vegetabili, p. 34. adducit contra Morisonum; quod in Hallucinationibus suis auctoritatem tanti viri Bâuhini elevarit. Charact. Plant. Genuin. Ammanni. p. 13.

Esteem of those who first advanc'd it. But see what he himself says upon that Subject; " I would not have you, friendly Reader, says he, to look upon me as a vainglorious and insolent Writer, because I do not only correct the Errors of those of this Age, but the chief of all the *Botanists* that ever liv'd; I mean the celebrated Brethren *John* and *Caspar Bauhinus*. By the frequent Inspection, and by a long and continued Examination of their Volumes, I find them to have been Persons of great Judgment, indefatigable Pains, and incomparable Knowledge in the *Botany*; and I do declare, that, whether by Fate or a natural Propensity, they had a great Desire to promote and encourage all the Students in that Science; but that both have frequently err'd, any Person, who has but a moderate Knowledge in the *Botany*, will soon observe, by the reading of this small Treatise: Nevertheless, I confess that to err is a human Failing. I am a Man my self, nothing is to be expected from me but what is human. I doubt not but I have also err'd (*ballucinatus*) in these small Treatises; therefore I desire to be forgiven by thee for these my *Hallucinationes* or Errors^m." This, one would think, is mo-

G

dest

^m Noli quæso amice lector me gloriosum aut insolentem existimare Scriptorem, quod non solum hujus sæculi sed omnium

deft and condefcending enough, attributing due Praifes to his Predeceffors, without affuming too much Glory to himfelf: Yet *Nebelius*, the Annotator upon *Ammannus*, will not let him go fo, but being prepoſſeſs'd with what others had advanc'd to his Prejudice, puts a ſiniſter Conſtruction upon this, contrary to what he deſires; and alluding to this Paſſage, he inſiſts, " The Difficulty and Extenſivenefs
 " of the Study of *Botany*, may eaſily excuſe
 " the raſh and unpremeditated Errors of that
 " moſt deſerving *Botaniſt*, *Caspar Baubinus*,
 " according to *Moriſon's* own Acknowledg-
 " ment, (*Loco Citato*,) in naming and diſtri-
 " buting of the Vegetables; which whether
 " *Moriſon* himſelf committed the like, when
 " he too confidently and boldly did dare to
 " aſſert, that the Method of diſtinguiſhing
 " the Plants by the Fruſtification, was only
 " diſcovered by himſelf, when he does not
 " mention, among the Authors cited for wit-
 " neſs, *Ceſalpinus* and *Columna*, who former-

num qui adhuc exſtitere, Botanicorum coryphæos duos Calparum & Joannem Bauhinum fratres corrigo. Ex frequenti enim ipſorum voluminum inſpectione & ex longa & diutina eorundem examinatione ipſos ſummi judicii, indefeſſi laboris & incomparabilis doctrinæ in ſcientia Botanica homines fuiſſe obſervo; ipſosque ſeu fato ſeu naturali propenſione maximum in promovendis ſtudiis Botanicorum habuiſſe deſiderium: pariter declaro erraſſe multoties utrumque; nemo in Re Botanica mediocriter verſatus inſicias ibit. Hos meos tractatulos legendo ſibi nihilominus humanum eſſe confiteor; homo ſum ipſe, humani à me nihil alienum puto; in hiſce meis tractatulis hallucinatum me eſſe non dubito. Quapropter hallucinationes meas ab amico leſtore notari deſidero. Præf. ad Halluc. Bauhin.

“ly commended and design’d this Method, I
“leave it to the Judgment of others.” The
Matchiavillian Principle here holds good,
*Calumniare audacter & semper aliquid ad-
harebit.* I would ask that Writer, whether
commending and designing a Method be put-
ting it in practice, by distributing of Plants
according to it? But his being prejudic’d a-
gainst Dr. *Morison* by the Instigation of o-
thers farther appears; for after he had ascrib’d
to him that due Praise which none yet had
the boldness to refuse, he says, “That he
“could not escape the just Censure of *John*
“*Ray* and *Pitton Tournefort*, for publishing
“the Thoughts of others as his own Inven-
“tion, and never known to any before.

It is these and the like Expressions, us’d by
Foreigners, that oblige me to insist longer
upon the Character of Dr. *Morison*, and to
search the Ground of all this Prejudice to the
Bottom: But before I do that, I shall produce
several Testimonies of more impartial Au-
thors, and even of those piqu’d against him,

* *Studii Botanici difficultas & amplitudo excusare facile
potest Caspari Bauhini viri in re Botanica (ipso Morisone in
præfat. hallucin. teste) optime meriti improvisos in denomi-
nandis digerendisque vegetabilibus errores; quales an etiam
Morison commiserit dum suam plantas à fructificatione dig-
noscere methodum à se solo detectam neminique prius cog-
nitam audacter nimis asserit & tamen inter auctores ad tes-
timonium citatos suis, Cæsalpini atque Columnæ qui ean-
dem methodum pridem commendarunt & designarunt, men-
tionem fecit, aliis dijudicandum relinquo.* Nebel. Annot. in
Amman. p. 13, 31.

thereby to shew the Value of that great Man; and to shew how far he is to be look'd upon as the Author and Founder of Method. I shall begin with the fore-cited *Ammannus*.

“ In the mean time, says he, by very good
 “ Fortune did the Town of *Aberdeen* in *Scot-*
 “ *land* bring forth *Robert Morison*, by whose
 “ Favour and inexpressible Diligence, the *Bo-*
 “ *tany* of the Ancients is recovered, and has
 “ now put on a quite different Countenance,
 “ as may be seen by any unbiass'd Person,
 “ who is not blinded with Prejudice in the
 “ *Hallucinationes*, which he so abundantly
 “ produc'd against the *Methods* of the Anci-
 “ ents, in his *Hortus Blesensis*, and *Historia*
 “ *Oxonienfis*; insomuch, that (without pre-
 “ judice to our Ancestors) I am not asham'd
 “ to say, there appears more Candour,
 “ more Truth, in these his nervous Works;
 “ and that there is contain'd in them, more
 “ to the Benefit and Advantage of the Pro-
 “ fessors, than in the most numerous Volumes
 “ of ancient Writings; and being oblig'd to
 “ declare it out of Conscience, rather than
 “ from any Love and Affection I may have
 “ to the several Parts of that Study, I doubt
 “ not but this Affair might have been brought
 “ to the utmost Pitch of Perfection, by the
 “ Publication of the other XXIV *Sections*,
 “ which would have compleated the whole
 “ *History of Oxford*, had it not pleas'd Al-
 “ mighty

“ mighty God to have dispos’d of that
 “ great *Botanist* otherwise ”. The same ingen-
 “ ingenious Author says further ^p, “ That *Cæ-*
 “ *salpinus Castellus*, and *Fabius Columna*
 “ had thought upon this Method, as appears
 “ by what is here and there scatter’d among
 “ their Writings; but I know not what Stops

o Interea Aberdunum in Scotia felici admodum omine protulit *Robertum Morisonum*, cujus auspiciis atque ineffabili solertia Botanica veterum delatavata atque aliam longe faciem nunc induit, veluti videri est cuilibet præconceptis opinionibus non obæcato ex Hallucinationibus quas in hortu Blesensi & historia Oxoniensi, luculenter adduxit, contra methodum antiquorum; adeo ut citra tamen injuriam antecessorum dicere non erubescamus, in nervosis hisce operibus plus nitoris plus veritatis atque plus commodi ad philiatros spectantis contineri, quam in numerosissimis voluminibus omnium quæ sapit veterum prosapiam. Conscientia cujusvis extra partium studia atque affectus positi, sit arbitra. Nec dubitandum quin ad supremum perfectionis apicem negotium hoc fuisset deductum editione restantium viginti quatuor sectionum quibus historia Oxoniensis tota compleri debebat, nisi deo cujus erat *ædægyion* de hoc insigni Botanico aliter visum fuisset. Amman. Præfat. ad Charact. Plant.

¶ Meditatos hoc fuisse ingeniosissimos *Cæsalpinum Castellum* & *Fab. Columnam* hinc inde ex scriptis illorum liquet. & nescio quid moræ interea interjectum fuerit quo minus luculque negotium istud potuerit perfici. insit aliquis, alii præter hos munere istoc functi sunt peculiare, methodum Botanicam adornandi. Audio hæc sed non memini me ullum autorem legere qui attendisset legem naturæ, id est quæ genera & species plantarum per notas essentielles, quæ semper & omni insunt, sumendo differentias à fine ultimo sciz. à fructificatione; non inqua mmemini ullius: Citra tamen supercilium & arrogantiam utpote qui per multos annos hoc unice egisset. At ipse *Morisonus* glaciem hæc fregit hyperboream in Hallucinationibus quas contra *Bauhinos* tam in histor. Oxoniensi quam hort. Bles. publici juris fecit. Amman. Charact. p. 3.—

" and Delays interven'd, which all along
 " hinder'd that Affair from being brought to
 " Perfection; let any Person produce ano-
 " ther (beside these) who did that Work, who
 " by a peculiar *Method* had adorn'd the *Bo-*
 " *tany*. I have heard of these Things, but
 " do not remember that I have read of any
 " *Author* who has so observ'd the *Method*
 " of *Nature*, that is, which distributes the
 " *Genera* and *Species* of *Plants* by the ef-
 " *fectual Notes*, which are in every one ta-
 " king their Distinction from the *Ultimate*
 " *End*, which is the *Fruëtification*. I do
 " not remember, says he, any who with-
 " out Vanity or Arrogancy has done so as I
 " have done for many Years. But it was
 " *Morison* himself who broke this tough Ice
 " in his *Hallucinationes* against the two
 " *Baubini's*, both in his *Hortus Blesensis*,
 " and *Historia Oxoniensis*". But his Anno-
 " tator will not let it go so, he tells you,
 " That *Conradus Gesnerus* had thought of
 " that Method 130 Years agoe, &c. when
 " he wrote to his Friends, that the Nature
 " and Kindred of the Plants was to be taken
 " from the Fruit, or rather Flower and Seed,
 " than from their Leaves &c."

That this was *Gesner's* Opinion, is own'd by the consent of several Authors, as also by

* Huiusque priorem C. Gesnerum qui ante plus centum &
 triginta annos in suis epistolis ad amicos scripsit ex fructu
 femine ac flore potius quam folio, stirptum naturas & cogna-
 tiones apparere. Nebel. Annot. in Amman. p. 4.

some Fragments of his Epistles yet extant; but then this Opinion was only scattered here and there, as *Ammannus* says of *Cæsalpinus*, without any Improvement made of it, or any *Method* brought to Perfection by it: Nor was it so long before *Cæsalpinus* and *Columna*'s Time, for *Gesner* was Coremporary with them. He wrote his Eistles, Anno 1564, and dy'd in 1565: *Cæsalpinus* 1562, and *Columna* much about the same time; for his Works were posthumous, being publish'd after his Death by *Hieronymus Columna* 1592, and afterwards 1606, by all which it appears, that the three wrote much about the same Time; and if *Gesner* did any thing upon that Subject, most of them perish'd by the Carelessness of *Wolphius*'s and *Camerarius*, as the ingenious *Tournefort* testifies; so that whatever any of them advanc'd upon that Head, whatever *Nebelius* or his Abettors, or rather Instructors, could say to the contrary, the bringing of Method to any degree of Perfection, is intirely owing to the great Dr. *Morison*, which will further appear by the Testimonies of other unbiass'd Foreigners, and even from the Writings of such as have express'd so much Enmity against him.

Dr. *Knaut*, in his *Methodus Plantarum Genuina*, testifies thus: " But when the celebrated *Morison*, observed that all these *Methods* were carry'd on by mere Accidents, that they were instable and falli-

ble, and as the Philosophers say, no ways
 Scientifick, therefore he neglected, and
 threw them off, substituting, or rather
 restoring more *essential Characters* or *Distinctive Notes* of *Plants*, which cannot
 deceive; and again, having shew'd how
 uneasy it was for *Caspar Bauhinus* to understand *Cæsalpinus* his *Method*: So much
 the more Praise is due, says he, to the *Celebrated Morison*, who having overcome
 the Difficulties that stood in his way, recovered his praise-worthy *Method*, and restor'd it from Darkness to Light", according to that notable Character given him by the *Celebrated Dr. Tournefort*^r.

The true Method of constituting the
Genera of *Plants*, may be attributed to
Gesner and *Columna*; but it's probable
 that had yet lain in Darkness, had not
Robert Morison, a *Scotch* Man, of *Aberdeen*, who was for several Years Overseer
 of the Gardens belonging to that High and
 Mighty Prince, *Gaston*, Duke of *Orleans*, renew'd, restor'd, and first of all ac-

^r Cum enim Clarus Morisonus in præf. Botan. hist. Oxon. & fest. de umbellif. animadverteret per mera accidentia procedere omnes istas methodos, instabiles adeo ac fallaces nequod philosophi autem scientificas; neglectis his rescisque, essentielles potius characteres seu notas plantarum distinctivas, a fructificatione fallere nescia desumptas, substituit aut vetius restituit. Knaut. Dissert. Prælim. de Meth. Plant. p. 3.

^r Tanto majori laudi datur Cl. Morisono, quod superatis quæ obflare videbantur difficultatibus methodum laudatam, velut è tenebris in lucem retraxit. Ibid. p. 3.

“ commodated

“ commodated it for daily Use, for which
 “ he’s highly to be prais’d, and he would
 “ have yet deserv’d much more, if he had not
 “ been too much puff’d up^r”. Thanks be to
 Mr. Ray for this last part of the Character,
 ’tis from his Insinuations that all these bad
 Impressions have proceeded, as is too evident,
 notwithstanding which he is forc’d to ac-
 knowledge his other Perfections in *Botanick*
 Matters.

“ So long as he (*Robert Morison* a *Scotch*
 “ Man, of *Aberdeen*) kept himself within
 “ his own Bounds, or mov’d within his
 “ own Sphere, by composing the Catalogues
 “ of Gardens, finding out the *Characteri-*
 “ *sick Notes* of the *Genera*, discovering and
 “ correcting the Errors, or as he is pleas’d
 “ to call them, *Hallucinations* of *Botanists*
 “ in the Disposition of the Species, he de-
 “ serv’d very much to be prais’d; but when
 “ he became too full of himself^u — I wish
 Mr. Ray had let this last part of Dr. *Morison’s*

^r Legitima igitur constituendorum Generum ratio Gesne-
 ro & Columnæ tribui debet, eaque forte in tenebris adhuc
 jaceret nisi *Robertus Morisonus*, *Scotus Aberdonensis*, qui per
 plures annos præfuit Hortis serenissimi principis Galtonis,
Aurelianensis ducis, eam quasi ab herbariis abalienatam re-
 novasset, instaurasset, & primus ad usus quotidianos adjunxisset:
 qua in re summis laudibus excipiendus, longe vero majoribus
 si à suis abstinuisset.

^u Hic quamdiu intra limites suos se continuit & catalo-
 gis Hortorum componendis notis Generum characteristicis in-
 dagandis Botanicorum, in dispositione specierum, erroribus aut
 ut loqui amat, *Hallucinationibus* detegendis, corrigendisque
 operam dedit, laudem sane meruit. Verum cum &c. *Rail Hist.*

Character,

Character, already cited*, alone, for *Turpe est Doctori, cum Culpa redarguat ipsum*. There is not one Word in all that second Part, but a malevolent Pen might apply, so as to make it retort upon Mr. Ray himself. So true it is, that *Carere debet vitio qui in alterum paratus est dicere*. But I forbear, least I should be said to reflect as much upon Mr. Ray, as he has done against Dr. Morison; and shall only add what Account I have receiv'd from those who were intimately acquainted with Dr. Morison, viz. That he was a plain, down-right, honest Man; no Flatterer nor Dissembler, but who would tell the naked Truth upon all Occasions, *Fuit vir qui ficum ficum vocavit*, says the Author of his Life. As he loved Botany himself, so he was a sincere, hearty Lover and Encourager of Botanists; his Fame was so far establish'd before he came to England, that he had no reason to be afraid that Mr. Ray's Appearance would darken his Light; but the Truth is, he had already establish'd a Method, such as he was of Opinion was sufficient for the Improvement of Botany. The Opportunities he had of observing Plants enabled him and render'd him still the more capable to correct what he might have done amiss in his first Volume, and alter the Dispositions as he had a mind, in what he was to publish in the other Volumes; so that he had Reason to be angry with any other, who

* P. 78. Litera h.

not having the same Opportunities of becoming *Botanists*, would attempt to establish any other Method than he had done. Mr. Ray on the other hand, had by this Time acquir'd a moderate Skill in *Botany*, and had he apply'd himself to, and kept a Correspondence with Dr. *Morison*, who was in such a Station as it was no disparagement for him to do so, then they might have compar'd their Thoughts, and communicated to each other what they found convenient for the Advancement of that Science, by one and the same Method, without endeavouring to multiply *Methods*, so as to confound the Learners; but when instead of that Mr. Ray would needs set up for a Method of his own, in Opposition to the other, Dr. *Morison*, or any other in his Station, had reason enough to be angry with him for it; for Mr. Ray labour'd under so many Inconveniencies when he compos'd it; the many Errors with which it abounded when compos'd, and the Assistance he had from Dr. *Morison's* Writings, (all which Mr. Ray acknowledges fully himself) were such as I am afraid will render Mr. Ray the ostentatious and vain glorious Person, and shew how fond he was to be Dr. *Morison's* Rival, and how little capable he was of being it. So that as Dr. *Morison* had reason to be angry with Mr. Ray, it was a great Failing in Mr. Ray to have such a Relentment against Dr. *Morison's* Memory, since 'twas Mr. Ray who first gave the ground of Offence.

But

But leaving this, and to shew how impartial I am, I shall produce several Instances to prove, that Dr. *Morison's Method* in his Second Volume, is not so perfect, but that it needs several Amendments, which had he liv'd, perhaps he had corrected himself; for as none in his Time understood better how to make Observations upon *Plants* than he did, so the Escapes in his *Method* seem to have proceeded purely from Inadvertency, and not from Ignorance.

*Dr. *Knaut* very justly remarks, " That he is not every where consistent, nor observes the *Method* he had propos'd with the same Constancy; but whereas he ought always to have taken the Notes of the *Subaltern Genera*, from the *Fructification* only, sometimes he takes them from the *Leaf*, sometimes from the *Stalk*, from the *Climbers*, *Capreoli*, and *Roots*; but for these he is rather to be blam'd for Inconstancy than for any inexplicable Obscurity". This is a just Character of his *Method*, and in this he is excusable so far, in that when he compos'd it, he was to do all of himself; not one of his Contemporaries so much as dream'd of *Method* before he did it; he had none to

* Hoc uno forte culpandus (*Morisonus*) quod illiſdem methodi vestigiis non ubique pari constantia insiſtit, sed quas à fructificatione petere undequaque debebat generis subalterni notas, à foliis, alicubi caulis, item capreolis, atque radicibus desumerit; inconstantia potius quam obscuritatis inexplicabilis coarguendus. *Knaut. Meth. Plan. genuin. p. 4.*

correspond

correspond or consult with concerning it; in the which he laboured under far greater Inconveniencies, than any who have writ upon Method since, who had nothing to do but observe his Steps, and correct his Escapes rather than Errors, in order to make up a compleat Method; for I find he fail'd chiefly in making of his *Sections* too large; so that after he has done with what more particularly belong'd to such a *Section*, there are some Incoherencies in several Chapters of the *Subaltern Genera*, v. g. In the *Seçt. de Umbellif.* which was the Specimen of all the rest, and therefore first published. After he has done with those, by the common Consent of all reckoned *Umbelliferous Plants*, he subjoins the *Umbelliferae improprie dictæ*, such as *Valeriana*, *Valerianella*, *Valeriana Græca*, by Tournefort call'd *Polemonium*, *Pimpinella Sanguisorba*, *Thalictrum*, *Filipendula*, *Ulmaria*; none of which can be clasp'd with the *Umbelliferae*, except by some Resemblance in the Disposition of the *Flower*, which is competent to other Plants beside them.

In the first *Section* he places *Christophoriana* next *Asparagus*, because its Berries are *Racematim dispositæ*, Chap. 2. the *Campanulatae Lactescentes*, such as *Convolvulus Scamonia dictus*, &c. betwixt the *Bacciferae* and *Pomiferae Scandentes*, though both of them have a pulposus and parenchymatous, and these *Campanulatae*

panulatae have a dry *membranaceous Fruit*; by which they should rather have been plac'd after them, or join'd with the other *Convoluti*. *Convolutus Heteroclitus sive Lupulus*, is *Heteroclitus* indeed in this Place; for there is nothing can bring it in here, unless it be an infirm Stalk, which requires a Pole to support it.

Seçt. 2. The first fourteen Chapters of this *Section* are acknowledg'd to belong to the *Leguminous Plants* by all Authors; but then the *Trifol. Acetof.* in the 15. *Frag. Vesca* in the 16. the *Pentaphyllæ* and *Pentaphylloid* in the 17. and *Pentaphyllis Affines*, as *Alchymilli*, in the 18, ought to be disjoin'd, and plac'd elsewhere.

Seçt. 3. *Tetrapetalæ Siliquosæ Bicapf.* are very regular for the first 10 Chapters; and the *Chelidonium majus* in the 11. may not be unfitly join'd with them, provided the *Glaucium* or *Papaver Corniculatum* be join'd with it; for they should always go together, notwithstanding that Dr. *Tournefort* will have the *Chelidonium* among the *Flores Cruciformes*, and the *Glaucium* among the *Flores Rosacei*, upon no other account than the Largeness of the *Petalæ* in the one, and Smallness in the other. *Fumaria* is not right plac'd betwixt the *Chelidonium* and *Raphanus*, *Lysimachia*, as being *Quadricapsular*, and the *Flower* being upon the top or the Pod may be plac'd elsewhere. *Papaver Capitatum* should

should not come in here, because its Head is not properly a *Siliqua* but a *Capsula*, no more than *Balsamina Fœmina*, because of the Fashion of the *Flower* and *Fruit*, which is *Unicapular*, not *Multicapular*. *Veronica* is but ill join'd with the *Tetrapetalæ Siliculosa*, because it has a *Monopetalous Flower*; nor do I well know, whether its *Fruit* should not rather be call'd a *Capsula* than a *Silicula*, though it in some measure resembles that of the *Bursa Pastoris*: Nor has the *Polygala* much to do with this Place, either by *Flower* or *Fruit*.

Sett. 4. goes pretty regularly on with the *Monopetalous Flowers*, divided into 6 *Segments* or *Hexapetalous* ones; to all which succeed a *Tricapular Fruit*, till it come to Chap. 25. at the second Distribution; and then I do not see how the *Anemone*, *Caryophyllata*, *Ranunculus*, and *Hepatica Nobilis* can come in.

Sett. 5. Has its *Title* from the Number of the *Capsula* and *Petala*. This, as much as any, wants to be more regularly dispos'd; for it seems the Doctor had heap'd them up without any special Regard, either to *Flower* or *Fruit*, v. g. If according to the *Fruit*, then the *Unicapulares* should have begun, and the rest of course, according to the Number, as *Anagallis*, *Nummularia*, *Auricula Urst*, *primula veris*, among the *Monopetalæ*. *Caryophyllus*, *Lychnis*, *Linum*, &c. among the *Pentapetalæ*. The *Bicapulares Monopetalæ*

la might have follow'd, as *Digitalis*, *Scrophularia*, *Antirrhinum*, *Linaria*. Next to them should have been the *Tricapsulares*, *Monopet. Lactescentes*, as *Campanula ejusque Species*, *Rapuntium*, and *Pentapetala*, *Hypericum*, &c. though, according to Mr. Ray, there are some of the *Hyperica* are *Quinquecapsulares*, *Asarum*, so called by Tournefort, or *Androsimum*, *Flore & Theca quinque-capsulari omnium maximis*, Moris. which is a Species of the *Hypericon*. But of these, and the like, I could give many more Examples, both in this second Volume publish'd by himself, and likewise in the third, publish'd by Mr. Bobart after his Death, to shew, that though he was the first who brought Method to any regular Footing, yet the short time he liv'd, and the want of Assistance for so great a Performance, are two very great Reasons why he did not bring *Method* to that Perfection he might have otherwise done: And as I have already told how he encreas'd the Number of his *Sections*, had he been more exact in the Manner of disposing his *Chapters*; and had he considered a little farther of the *Number* of the *Petala* in the Flowers, or look'd upon them to be of as great moment as they have been since he wrote, his *Method* had been better look'd upon, his Enviars had not had such an Opportunity to detract from his Fame; and *Method* it self had arriv'd at a far greater Perfection,

section, had not his untimely Death prevented it; so true is the Proverb, *Better is a living Dog than a dead Lion*. How great a Length he had gone, in order to bring *Method* to Perfection, let any impartial Reader judge; when they consider, with what Accuracy he return'd every particular Species to its proper *Genus*, and how exact he was in the Description of them, at a time when scarce any knew how to give a tolerable Description of any particular *Plant*: So that the *Tetrallick* compos'd by the Celebrated Dr. *Pitcairn*, and subjoin'd to his Picture, will seem to be no *Hyperbole* to those who shall seriously peruse his Writings.

*Quæ, Morisone, viro potuit contingere major
Gloria, Pæonium quam superasse Genus?
Ipse tibi palmam Phæbus concedit Apollo,
Laureaque est Capiti qualibet Herba tuo.*

Mr. *Ray*, his Competitor, was the next who attempted any thing upon *Method*. He from his Infancy had a great *Genius*, not only for *Botany*, but for all the other Parts of the natural History: Beside that, he had a peculiar Faculty of excerpting from *Authors* what made for his Purpose, when he betook himself to any particular Science. This set him early in the Humour of writing. His first Essay was the *Catalogus Plantarum Circa Cantabrigiam*,

Ray's Method.

H

where

where he tells, in the Preface, what Difficulties he surmounted, before he could arrive at any tolerable Degree of Knowledge in the *Botany*, for want of knowing *Botanists* to teach him, and having only Books to rely upon, whose Descriptions were often faulty; That after some time he began to consider to what Tribe or Family each Plant did belong: but as *Method* at that time was not understood, his Knowledge that way could not be very great. At length, he says, after six Years he began seriously to think of composing a Catalogue of Plants, which naturally grow near to *Cambridge*. He was three Years in perfecting this Work, and at last he publish'd it in *Anno 1660**. but did not think fit to fix his Name to it, until he should see how this his first Essay would take. The Catalogue, considering that neither the *Botany*, nor *Method* of distributing Plants were as yet well understood, is tolerably well done. It's the Effect of a good deal of Reading, and there are here and there not unfit Observations upon several of the *Plants*, chiefly concerning their *Virtues*, but few or none in rectifying of the Descriptions of the Plants given by Authors, or of their *Genera*; and they being Alphabetically dispos'd, he had no Difficulty in the Distribution. *Gerard*, *Park.* and the *Bauhini*, were they whose Names he generally made use of.

* Præf. ad Catalog. Plant. Circa Cantabrig.

About seventeen Years after this, *i. e.* Anno 1677. having now travelled all over *England*, as himself informs us, and understanding that the *Cambridge Catalogue* was sold off, and that a new Edition was wanted, he enlarg'd the Bounds, and compos'd a Catalogue of all the *English* Indigenous Plants, entituled, *Catalogus Plantarum Angliæ & Insularum adjacentium*. In the Preface to this, he promises shortly to publish his *Nova Methodus*. And now he seems to be fitted for such an Undertaking; for *Morison's Prælium Botanicum* had been publish'd eight Year before, and no doubt such a diligent, inquisitive Person, as he was, would be sure to excerpt whatever was fit for his Purpose, as himself acknowledges. His Observations chiefly consist in enumerating the Virtues, for as yet he had not accustom'd himself to the making Observations upon the Plants themselves; and indeed that seems to have been much his Failing, throughout the whole Course of his *Botanick* Writings; that he trusted more to the Observations of others than to his own: Which thing expos'd him first, to the Censure of Dr. *Morison*, who thought it strange, that Mr. *Ray* should still retain the Names, continue to acquiesce in the Errors, and yet compeal with him, who made it his continual Business to detect the Errors of others, by proper Observations of his own. This it was which made Dr. *Morison* often say, that Mr.

Ray studied Plants more in his Cloſet than in Gardens and Fields; and this was the firſt Ground of Contention betwixt them: For Dr. *Moriſon* being a plain dealing Man, and one who would tell the Truth at all Hazards, did not fail to tell it upon all Occaſions; eſpecially ſince he underſtood that he was ſet to work in *Methodiſing* of Plants, when he ſcarce knew their *Characters* by ocular Inſpection: And it was the Tartneſs of this ſevere, though true Reflection, which created ſuch a Reſentment in Mr. *Ray* againſt Dr. *Moriſon's* Memory, even after the Doctor's Death, that he never forgot it to his dying Hour, as is already declar'd. Nor was this Diſeſteem of him upon that account, only harbour'd by Dr. *Moriſon*, but by all Foreigners, who had occaſion to ſee his Writings: This it was which gave occaſion to Dr. *Tourneſort* to reflect ſo much upon his want of proper Obſervations upon Plants in his *Elementes Botaniques*, as Mr. *Ray* himſelf takes notice ^y.

It was this which made his Hiſtory ſo little valued abroad; and this made even his *Methodus Emendata* receive ſo little Encouragement here in *England*, that he was forc'd to ſend it to *Holland*, and make uſe of the Interſt of Dr. *Hotton's* Influence, before he could get it publiſhed there.

^y Verum dum paginas negligentius revolvo, me ſepius nominatum tuncque fere notatum ac reprehentum invenio. Raii Epiſt. ad. Rivinum. Poſt. p. 52.

Indeed if we consider the Inconveniencies Mr. Ray laboured under, when he set to work about his *Nova Methodus* ², it may be look'd upon as a Piece of the greatest Boldness to attempt it; and it is very much that he got it perform'd, faulty as it is: But, as is said, he was oblig'd to Dr. Morison's *Præludia* and *Hallucinationes* for it, which he himself does not deny ³; and therefore though he assum'd the Title of it to himself, yet the Foundation is Dr. Morison's. This *Nova Methodus* being published anno 1682, he immediately after that compos'd his General History in two Volumes, which he publish'd four Years after. This is chiefly taken from J. Baubinus, his Brother Caspar, Clusius, &c. as also from Dr. Morison's *non Descripts* in his *Præludium Botanicum*, and but a very few Observations of his own. So that these Volumes owe no more to him than the Pains of Collecting, and the *Method* of *Distribution*, which is altered a little from the *Nova Methodus*, but not purg'd of its Imperfections, as is by him-

² Cum species plantarum hæcenus cognitæ nondum viderim, nec dum descripserim; cumque rure degam Londinio aut Oxonio procul nec Hortus Botanicus in propinquo esset quem nondum satis exploratas inspecturus adeam nec mihi ad plantas conquirendas, coemendas otium aut facultates suppediant.

³ Nec reticere debeo me è D. Roberti Morison M. D. & Botanices professoris Oxoniensis præludii Botanici & historia plant. universal. mutuatum esse quæ ad rem nostram facere videbantur. Raii Præf. ad Nov. Method.

self own'd in his *Methodus Emendata*^b; and what is the Opinion those abroad have of it, is to be seen in *Rivini*, his Epistle to him^c.

The next Treatise he publish'd was his *Sylloge Stirpium extra Britannias Nascentium*, which is compos'd of several Catalogues of Plants, either observ'd by himself in his Travels, or excerpted from Authors. His Genius seems to have been much bent towards the writing of Catalogues, and finding out the *Locus Natalis*, which is of no small use to those who travel to those Parts mentioned by him; and it had been no small Advantage to the *Botany*, if he had understood *Method*, at the time he observ'd where the Plants grew, so far as to give the Characters of the Plants, when he had so many good Opportunities of seeing them. In the Preface to that Volume there are two things remarkable.

1. He takes notice of the Male and Female Flowers in the Plants, and goes into Dr. *Grew's* Sentiments, concerning the Manner of *Fæcundation* of the Seed; which I suppose he has taken from what Dr. *Grew* advanc'd upon the Subject: But of this more hereafter.

^b Quod Methodum illam qua in historia plantarum stirpibus dispondendis usus sum, suis etiam defectibus & vitiis laboraretur, ipse animadvertit, tum ab aliis admonitus sum. Præf. ad Meth. Emend.

^c Verum de methodo, Deo vitam prorogante viresque & valetudinem largiente, in postea promittis, (Præf. ad Syllogen. p. 19) utinam id factum fuisset ante historiam plantarum editam. Sat cito attamen si sat bene. Rivini Epist. ad Johannem Ravium. p. 13.

2. He takes notice of *Rivini's* Method, which gave ground to the *Dissertatory* Epistles betwixt *Rivini* and him; as also to the *Dissertatio de Variis Methodis*, where he takes *Tournefort's* Method to task.

His *Catalogus Plantarum Angliæ* being well receiv'd, and he by this time having arriv'd at a competent Degree of Knowledge in *Method*, undertook the disposing of the *British* Plants (formerly receiv'd alphabetically) into his *Method*, under the Title of *Synopsis Stirpium Britannicarum*.

Dr. Morison being dead, and the Science of *Botany*, by his Influence first, and now by *Mr. Ray's* Industry, having put on a quite different Face, and begun to flourish more in *Britain*, by the indefatigable Endeavours of a great many knowing and ingenious Persons: And *Mr. Ray* having begun of a long time to write, all the *British Botanists*, as one Man, entertain a Correspondence with him, and communicate to him whatever they found worthy of Observation. So that if *Mr. Ray* began to write with great Disadvantages, no Man had better Opportunities to write afterwards to good Purpose than he had; nor to become a most famous and celebrated *Botanist*; nor was there any Science which made greater Advances in this learned Age than the *Botany* did, during the Life of *Mr. Ray*. By *Dr. Morison's* Death, *Mr. Ray* had no Competitor. *Botanists* abroad had not thought

of any other *Method* than Dr. *Morison's* till Mr. *Ray's* appear'd: And Mr. *Ray* being now more fully inform'd of the Indigenous Plants, his *Method* also being now brought to a greater Perfection, he disposes of them according to it. This is a notable Performance, and most deserving of the Name of one, who had now acquir'd so great Fame. In this he has the Civility every where to acknowledge his Benefactors; neither does he keep up from any what is due to them, except Dr. *Morison*, whose Distribution he often uses, without ascribing his Name to them; as can be made appear from several Instances: I shall only name one. In the former Catalogues he followed *C. Bauhinus*, in the Distribution of some of the *Alfine's* and *Anagallis aquat.* but now he makes them all *Veronica's*, being taught so to do by *Morison's Prælium Botanicum* and *History*, and yet points out this Distribution as his own. For an Example see the following Note*. For as all *Botanists* have

* *Alfine* fol. Tuffag. Raii Cat.
Cant. Cat. Plant. Angl.

Alfine fol. *Veronic.* Ibid.

Alfine *Hederacea.* Ibid.

Anagallis aquat. Min. fol.
Subrotund. Cat. Cant. p. 10.
Cat.

Veronica Floribus Singularibus in oblongis Pediculis Charmædrifolia Raii Syn. Stirp. Brit. p. 178. Mont. Halluc. 392.

Veronica Flosce. Singularibus Cauliculis adhærentibus. Ib.

Veronica Flosculis Singularibus *Hederulæ* fol. Ibid.

Veronica aquat. Rotundif. beccabunga dicta minor Synopl.

have the Civility towards one another, to mention the Author, either of a new Distribution, new Genus, or new Name of a Plant, so Mr. Ray fail'd in this, that he gives *Morison's* Distribution of these Plants among the *Veronica's*, but does not mention *Morison's* Name; by which they who know nothing of it will be ready to take them for Mr. Ray's own Disposition; whereas had he affix'd the Name *Morif.* to them, he had done more for his own Credit than otherwise.

Mr. Ray, I say, is so just to his other Correspondents, that he mentions every one of them with that just Regard and Gratitude they truly deserve at his Hands. In that elaborate Treatise therefore, he every where acknowledges Mr. Dale his Fellow labourer, Mr. Dodsworth, Doody, Lawson, Lbuid, Newton, Petiver, Dr. Plot, Pluyknél, Sloane, Sherard and Robinson; nor is the ingenious Mr. Jacob Bobart to be forgot, whom with Mr. Walter Moyle, and Mr. William Ver-non, he adds, as his Benefactors, in the Preface to his second Edition.

Cat. Plant. Angl. p. 19.	Synop. Stirp. Brit. 178. Morif. Halluc. 393.
Anagall. aquat. Min. fol. oblong. Ibid.	Veronica aquat. Longifol. Media. Ibid. Min. fol. oblong. Morif. Ibid.
Anagall. aquat. Min. fol. Augustifol. fol. Ibid.	Veronica aquat. Augustif. Min. Raii. Ibid. Aquat Augustif. Morif. Ibid.
Chamædris Sylvestr. Spuria Cat. Cant. p. 32. Cat. Plant. Angl. p. 64.	Veronica Chamædris Sylv. dicta. Ibid.

This

This is a Set of such *Eminent Botanists*, as no Nation can produce the like Number to have flourish'd in any one Age at once, or within so small Bounds, most of which either have, or are about to publish elaborate Treatises of their own Composure upon that Subject; among whom the whole Society of *Botanists* throughout the World are big with the Expectation of that incomparable *Pinax*, as the Work of so many Years indefatigable Endeavours, the Product of so numerous and unparallel'd a Collection of Specimens, and the effect of so vast a Correspondence which that eminent *Botanist*, Dr. *William Sherard*, whom *Dillenius* and many others, call *Botanicorum Anglorum decus singulare*^d, or as *Volkhamer* says, that he is *Botanicus Anglicus sine pari inque Naturalium Historiâ versatissimus*, has kept for many Years, every where, whither the ordinary Course of Commerce, his extraordinary Fame for his Skillfulness in *Botany*, or his own Personal Presence could lead him; so that if great Assiduity, and indefatigable Pains in searching after the Plants themselves, and the collecting of *fair Specimens* in most of the Habitable Parts throughout all *Europe* and *Asia*, visiting the most curious *Gardens* every where, and obtaining from thence whatever was rare and curious, which the most eminent *Botanists*, where-

^d Præf. ad. Nov. Gen. Plant.

ever he went, had the greatest Fondness to afford him. I say, if all these, together with his own Accuracy in observing the Plants or Specimens, and most intimate Knowledge how to dispose them into a *Method*, can render a Work compleat that may be expected of Dr. *Sherard* his *Pinax*, which 'tis hop'd will, e'er long, see the Light, if a continual Supply of new Specimens and Non Descripts do not retard it, by still affording new Work, in disposing each of them according to their true *Genera* and *Species*, by which we may expect That *Method*, (which is at present the occasion of great Disputes) may receive the finishing Stroak.

Mr. *Ray* being thus furnish'd with Correspondents at Home, and the Assistance of those eminent *Botanick* Authers abroad, who having learn'd how to dispose *Plants* into a *Method*, from those of *Britain*, and in their Turn had begun to cultivate *Botany*, and frame new *Methods*, thought it convenient to publish a Supplement to his History, and correct his former Method; Therefore, having collected from *Herman*, *Rivini*, *Tournefort*, *Volkhammer*, *Plumier*, *Commelli*, *Commelin*, *Hortus Malabaricus*, and others mention'd in the Preface, he from them, together with what Materials his *British* Friends afforded him, compos'd a Third Volume of History, as big as any of the two former; among these, that accurate and expert *Botanist*

nist, and most diligent and curious Natural Historian, Sir. *Hans Sloane*, Baronet, and M. D. gave no small Assistance, whose extream Knowledge of the *Plants* very well appears, by his *Catalogue of Jamaica Plants*, from that great Number of *Non-descripts*, whereof he communicated the Manuscript Description to Mr. *Ray*, and which make up no small part of his *Supplement*, and from his *Natural History of Jamaica*, whose diligent Search and Enquiry after all Kinds of *natural Productions*, and whose immense Collection of the *Specimens* of all Kinds of *Plants*, which with his rich Cabinet of *Medals*, choice Library of *Books*, and other remarkable Pieces of Art, serve to make up one of the most valuable *Museums*, or Chamber of Rarities, that is this Day to be seen any where, especially in the Hands of any private Person: To which Mr. *Petiver's* Collection of *Rarities*, dry'd *Specimens* of *Plants*, and *Books*, has of late made no small Addition. That late curious and most indefatigable, celebrated Author, by his singular Knowledge in all the Parts of the *natural History*, particularly of *Plants*, by his great Industry and unwearied Diligence in traversing most Parts of *England* and *Holland*, by keeping Correspondence with most of the *noted* and *ingenious natural Historians* every where; by his daily receiving of new Supplies of *natural Productions* from all Parts of the World, made up

up a most curious Collection of Rarities; and by his *Museum, Gazaphylacium Artis & Naturæ*; Collection of *Amboina Shells*, and *American Ferns*; also by the *Prints* of his *British Herbal*; and last of all, by his *Herbarius Siccus*, which makes up so good a part of this *Supplement* of Mr. Ray, (all which are now in the Custody of Sir *Hans Sloane*) acquir'd immortal Fame during his Life, and has left a perpetual Memorial of his Labour, Industry and Pains behind him, by the fore-mention'd Writings and Prints, which are now dispers'd every where.

But that which has render'd Mr. Ray's *Supplement* the more compleat, is the considerable Help afforded him by Dr. *Sherard*, who not only enrich'd it, by the Addition of a great many *Non-descripts*, but also by his Goodness and Civility towards him, in comparing and correcting his Manuscripts, and fitting them for the Press, when himself, through Weakness and old Age, had not Strength to perform it.

And now I am come to his long look'd for, and much wanted *Methodus Emendata & Aucta*. Dr. *Morison's Method*, by his untimely Death, never was compleated, for it still wants the first Part, which is that of the *Trees and Shrubs*. His own *Nova Methodus*, by the great Advancements *Botany* had made every where, was found erroneous; those abroad were now fam'd for *Method*,
when

when it was almost worn out in *Britain*, where it first began : Therefore Mr. *Ray* found it convenient to correct what he had formerly writ upon that Subject, and to enrich it with new Observations and Characters of *Plants*, from *Herman*, *Rivini*, and *Tournefort*, and from what his *British* Correspondence communicated to him ; among whom was that ingenious and most expert *Botanist*, Dr. *Charles Prestone*, Intendent of the *Physick-Garden* at *Edinburgh* ; so that it is now render'd a most compleat Work, and one of the best Performances upon that Design. But the Science of *Botany* is so very extensive, and to write upon *Method* depends so much upon the particular Observations made upon the *Plants* themselves, that upon further Examination, this *Method* of Mr. *Ray* is not yet purg'd from all its Defects, which since *Dillenius*, of whom hereafter, has undertaken to correct and supply, I shall leave it to him and proceed to give a short Account of the *Method* it self.

He divides the *Plants*, first into the *Plantæ non Floriferae*, and *Floriferae*. I love this Distinction much better than his former, which is still us'd in his *Supplement*, viz. into *Plantæ Imperfectæ* and *Perfectæ*, though both proceed from the same Reason, because there are a great many *Plants*, which at first View, without the help of Magnifying-glasses, appear to have neither *Flower* nor *Seed* ;

but

Of the different Methods, &c. III

but that all *Plants* have both, is now plainly made appear, from the curious Observations of some late, modern, nice Observers of *Plants*, particularly of Mr. *Geoffroy* in the Vegetation of the *Truffles* or *Tubera Terræ*, and ^e Mr. *Reaumur* upon the *Flower* and *Seed* of several *Fucus's*; ^f and other *Marine Plants*, ^g and several others, notwithstanding what *Dillenius* may alledge to the contrary, as has been observ'd. Under the Head of the *Non-floriferae*, are comprehended the *Fuci*, *Fungi*, *Musci*, *Submarinae* and *Capillares*.

Mr. *Ray* divides the *Floriferous Plants* into *Dicotylidones* and *Monocotylidones*; the *Dicotylidones* are they whose *Seed* sends forth two *Seed Leaves* when it springs, and the *Monocotylidones* only push forth one.

The *Dicotylidones* are *Herbæ Flore Stamineæ*; these in his *History* and *Supplement* are clais'd among the *Plantæ Imperfectæ*, because the *Flowers* have no *Petala*, but only *Stamina* and a *Calix*: Then he goes on with the *Lactescentes* and *Pappescentes*, *Corymbiferae* and *Capitatae*, of all which we have given some Hints already.

From them he proceeds to the *Flore Perfecto Simplici*, *Semine nudo Solitario*, as *Valeriana*, &c. the *Umbelliferae* or *Gymno Di-*

^e Memoir del Academie Royal de Sciences pour L'an 1711. p. 29. ^f P. 371. ^g Pour L'an. 1712. p. 28. Edit. Amsterdam.

Spermae,

Sperma, whereof somewhat already; the *Stellata*, *Asperifolia*, and *Verticillata*. The Notes of all these three, are chiefly taken from the Disposition of the *Leaf*.

Then he goes on to consider them in their Fructification, as *Semine Nudo Polysperma*; *Herbæ Pomifera*, *Baccifera*, *Multi-siliqua*, *Vasculifera*, and flavoring *Flore Monopetalo*, *Dipetalo*, *Tetrapetala* *Siliquosa*; and *Leguminosa*.

The *Monocotylidones*, are *Graminifolia Florifera*, *Vasculo Tricapsulari*, *Bulbosis Affines*, of which already, *Graminifolia Culmifera*, as the *Frumenta* and *Gramina*; and last of all, the *Anomala*, or *Incerta Sedis*.

The *Trees* are divided into the *Flore à Fructu remoto*, as the *Conifera*, non *Conifera*; *Quercus*; *Pilulifera*, *Platanus Lanigera* seu *Papposa*, *Populus Salix*, and *Baccifera*, as *Myrtus*, *Juniperus*, *Taxus*, *Morus*.

The *Arbores fructu contiguo*, are *Pomifera* and *Baccifera*, *Umbilicata*, *Prunifera* seu *Testacea*, or Stone-Fruit; *Pomifera* and *Baccifera* non *Umbilicata* as *Malus Aurantia*, &c. among the *Apples*; and *Viscum* among the *Berries*.

They are in the third Place, divided into *Fructu Sicco*, as *Acer*, *Fraxinus*, and *Siliquoso non Papyllonaceo*, as *Sena*, *Cassia*, &c. *Papyllonaceo*, as *Anagyris*, *Collutea*, &c.

Thus

Thus I have briefly given an Account of all the *Botanick* Writings and *Method* of Mr. *Ray*, of whom to give an impartial Character, I cannot do it more truly than in his own Words, when speaking of *Johannes Baubinus*, viz. “*That he was a Man of great Learning, a faithful Friend, of infinite Rea-*
“*ding; of a ripe Judgment, and thoroughly*
“*acquainted in all the Writings of the mo-*
“*dern and ancient Botanists, and most con-*
“*versant in all kind of human Literature*”, particularly the *Natural History*, in which he made a vast Proficiency, as well in the Animal and Mineral, as in the Vegetable Kingdoms; He laboured under great Disadvantages at the beginning of his Studies, but that was afterwards sufficiently recompens’d, by the vast Number of Correspondents he had towards the latter end of his Days, and happy had it been for *Botany*, had he been at Pains to examine the *Plants* themselves before he began his *Method*, and continued to make his proper Observations upon them, before he publish’d any other of his *Botanick* Works; His Writings would not have needed so many Corrections, Amendments, and new Editions:

i Vir Eximie eruditionis, summæ fidei, infinitæ. Lectoris, maturi judicii, in omnibus Botanicorum, tam antiquorum quàm recentiorum scriptis versatissimus, omni humanioris & severioris literaturæ versatissimus. Raii Cat. Plant. Circa Cantabrig. Explic. nom. Auth.

Nor would he have been so much expos'd to the Obloquy and Reproach of others during his own Life.

In a word, He was a great and good Man, and did not behave unworthy of himself in any thing, so much as in that cruel Relentment he always had against Dr. *Morison's* Memory; in which perhaps it may be thought I have insisted too long already; but all I design'd thereby, was to give an impartial Account of the ground of the Debate betwixt them.

As to his *Method*, I can give no better Account of it, than that of the celebrated Dr. *Tournefort*, who having reflected too much against him in his *Elementes Botaniques*, was advis'd to desist from so doing in his *Institutines Rei Herbariae*, by that ingenious and expert Botanist, Dr. *Charles Preston*, as himself intimates in his Letter to Mr. *Ray*, and therefore Dr. *Tournefort* says no more of him, but gives this just *Character of his Method*.

“ *John Ray*, Fellow of the *Royal-Society*
 “ of *London*, was one who left nothing of
 “ almost all the Parts of the *Natural History*
 “ untouch'd; he was not contented with ha-
 “ ving collected, illustrated, and digested into
 “ one Body, the best Things that are to be
 “ found in every one of the *Botanick Wri-*
 “ ters, and to have added several new *Plants*,
 “ but he also handsomely distinguish'd all the
 “ *Plants*

“ *Plants* already known, attributing to
“ every one their proper *Notes* ^h.

I have now done with these two great, *British Botanick* Lights, who have favoured the World with such Discoveries and Improvements as have been since sufficient to exercise the Fancies of the curious *Botanists* every where Abroad, and as an *eminent Botanist* lately observ'd to me, that Dr. *Morison* is to be valu'd for his Discovery of *Method*, as Dr. *Harvey* for the *Circulation of the Blood*, though there are not wanting Malevolent Writers, who would deprive both of that just Honour and Praise that is due to them for so valuable Discoveries. 'But 'tis not they alone whom the envious *Foreigners* would deprive of their true Merit; in spite of which *Britain* still remains happy in a great many other valuable Discoveries and Improvements made within her Borders, which no other Nation can pretend to the like, let grinning Malice do her worst.

Paulus Ammannus was the first
after Mr. *Ray*, who attempted
any thing of *Method*; he pub-

Ammannus Method.

ⁱ Johanni Raio, socio Regio Londinensi, qui nullam ferme historiae naturalis partem intactam reliquit. Non fuit satis quaecumque optima in singulis plantarum scriptoribus occurrunt in unum corpus coacervasse, digessisse, illustrasse, quam plurima nova addidisse; plantas etiam hucusque cognitae in sua genera pulchrè distinxit, singulorum proprias notas recensens. Tourn. *Isagog.* 53.

lish'd his *Character Plantarum Naturalis à fine Ultimo, viz. Fructificatione desumptus*. He treats of the *Plants* Alphabetically, and ascribes Dr. *Morison's* Notes to them, without any considerable Alterations. The Treatise is but short, and only design'd for a Pocket Volume. This he publish'd at *Leipsick*, Anno 1685. This small *Manual* is reprinted at *Frankfort*, Anno 1701. by Dr. *Nebelius*, who has enlarg'd it with Annotations, chiefly compos'd of Observations taken from other *Botanick* Authors since the first Publication.

Herman's Method.

The next is Dr. *Herman*, one of the most consummate *Botanists* of this last Age: He was Professor of *Botany* at *Leyden*, and travell'd assiduously in rectifying of Dr. *Morison's* *Method*; for as has been told, Dr. *Morison*, by his untimely Death, left his *Method* incomplete; Mr. *Ray* liv'd to support the Authority of his, but Dr. *Herman* not being pleas'd with it, as not being brought to that Perfection he wish'd for, preferr'd Dr. *Morison's* to it, as aiming at a more regular way in disposing of the *Plants* according to their *Fructification*, and has alter'd it in such a manner, that it ceas'd any more to be Dr. *Morison's*, but Dr. *Herman's*; as if one by repairing of an House, should so alter the several Apartments in it, that it may rather be call'd a new House, built upon the former Foundation.

He

He begins with the Consideration of the Number, Disposition, and other Accidents belonging to the *Seeds*; therefore they are, according to him, either *Gymnopolysperma*. Here he justly places *Chelidonia Minus*, *Hepatica Nobilis*, along with the *Ranunculi*; as also *Adonis* and *Anemone Nemorosa*, and its *Congeners*; neither are the *Pentaphylla*, and *Pentaphylloides* unfitly brought to this Neighbourhood. Most of this Class are *Pentapetalæ* or *Polypetalæ*, but then he subjoins the *Malvaceous Class*, which is wrong, both upon Account of the *Monopetalous Flower*, and *Capsular Fruit*.

The next are the *Gymnodisperma*, or *Umbellifera*, because of the two *Seeds* succeeding to each *Flower*; and since he has so little regard to the *Flower*, he might have subjoin'd the Tribe of the *Rubia's*, *Aparine*, *Asperula*, &c. for they have *Bina semina post singulos Flores*, and are sometimes *Umbellatim disposita*, as in *Asperula*, and their having *Monopetalous quadripartite Flowers*; and *Stellate* or *Radiate Leaves* did not hinder their being brought into the Neighbourhood of the other, since they were to be led only by the Disposition and Number of the *Seed*.

3. *Angiomonosperma*, when one *Seed* succeeds to each single *Flower*. *Valeriana* is justly separated here from the *Valerianella*, because of its having a *pappous Seed*. Mr. Ray

joins all the *Plants* of this Tribe together, under the Title of *Plantæ flore simplici semine nudo solitario post singulos Flores*^k; and I doubt if any of them will answer it; for each *Seed* of the *Valeriana*, as is rightly observ'd by *Knaut*, has a striated *Capsula*, in which each oval-pointed *Seed* is contain'd. *Valerianella* has a *Capsula* consisting of two Parts, yet generally having but one *Seed*, one part of the *Capsula* for the most part being empty, as is well observ'd by *Tournefort*, though *Rivini* would have two *Seeds* to succeed each *Flower*, by which it might be class'd among the *Umbelliferae*, according to *Mr. Ray*, but since that do's not always hold, and that *Characteristick Notes* are not to be taken from accidental Excursions, it may be very well plac'd among the *Monocarpi*, as all the others of this Class deserve to be. The *Mirabilis Peruviana*, now found out to be the *Jallapa*, seems to me to be a *Monocarpus*, for it can easily be strip'd of its outer Coat, when not dry'd up; and the *Capsulae* of all the *Monocarpi* are so even, the *Fruit* of the *Agri-monia* will not easily open when dry, tho' when it usually containstwo*Seeds*; neither will the *Seeds* of the *Malva*, some *Trefoils* and *Melilots*, nor *Fumaria*, easily quit their *Capsula*; though now, by the Consent of most *Authors*, all of them have a *Capsular Fruit*

^k Meth. emend. p. 44.

I think, as has been observ'd. *Circea* comes very well in, next to the *Agrimonia*, as to their *Fructification*, and therefore the *Flora Batava* might have spar'd a new Title, by making *Circea Angiospermos*, and *Agrimonia Angiospermis Affinis*, or *Monocarpos*, whereas its truly *Dicarpos*.

After this he goes on with Mr. Ray in the Enumeration of the *Pappescentes* & *Lactescentes*, *Pappescentes non Lactescentes*, *Capitatae sive Floribus Fistulosis*, *Planifoliae non Pappescentes* & *Lactescentes*, *Corymbiferae seu seminibus solidis*, but do's not distinguish betwixt the *Nudae* and *Radiatae*. *Ageratum sive Eupatorium Mesues*, by what I could yet observe, is a *Ptarmica*, and therefore is justly call'd by Tournefort, *Ptarmica Lutea Suaveolens*, of which I convinc'd Dr. Prestone long ago; and *Draco Herba*, or *Tarragon*, ought rather to be plac'd among the *Abrotana*, than betwixt *Artemisia* and *Tanacetum*. *Scabiosa* might go along with *Cyanus*, and therefore there is no need of a new Title; such as *Floribus Pluribus in Capitulum Congestis*. *Eryngium*, is justly plac'd by Tournefort among the *Umbelliferae*.

Next to these follow the *Stellatae*, *Asperifoliae*, and *Verticillatae*. I have observ'd, that the *Stellatae* ought to succeed the *Umbelliferae*. The *Asperifoliae* and *Verticillatae*, may very well follow each other, by the Reason of four Seeds succeeding to each

Flower, but then, according to the *Method* laid down, the Title should have been alter'd, and the *Stellatæ* should have been entituled, *Gymno dispermæ*, and the other two, *Gymnotetraspermæ*, with which *Lysimachia Gale-ricula*, or *Cassida* of *Columna*, and *Dracocephalon* may be join'd, but not as *Affines*, being truly of the same Family by the *Fru-ctification*; from whence we may see the Inconveniency of *classing*, by the *Disposition* of the *Leaf*, for none of them are *Plantæ Verticillatæ*, and scarcely *Spicatæ*.

After them come the *Capsular Plants*, as *Unicapsularis*, but then here arises a great Confusion in respect of the *Flower*. *Primula Veris*, *Auricula Ursi*, are *Monopetalosa*, and *tubulated*. *Alsine*, *Lychnis*, *Caryophyllus*, have *Polypetalous*, or *Pentapetalous Flowers*, with a *Tubulous Calix*. *Anagallis*, *Nummularia*, are *Monopetalous*, not *Tubulous*. To which may be added, *Portulaca*, *Hydrophyllum*, *Glaux*; but *Trifolium Paludosum*, plac'd betwixt the two last, has a *Tubulous Flower*, so that to render this Tribe of the *Unicapsular Plants* more regular, it had been convenient to have distinguish'd them into *Monopetalous* and *Polypetalous Flowers*, and the *Monopetalous* again into those which have a *Tubulous Calix*, and which not.

2. *Bicapsulares*. Here arises another Confusion. *Centaurium Minus*, *Lysimachia*,

chia Lutea, *Seda Bicornia*, seu *Saxifragæ Albæ Species*, *Blattaria*, *Verbascum*, *Gentiana*, *Digitalis*, *Gratiola*, are all *Monopetalous Flowers*, either divided into equal *Segments*, or having equal *Borders*; to which may be added, *Hyoscyamus*, *Nicotiana*, whereas *Acanthus*, *Antirrhinum*, *Linaria*, *Scrophularia*, *Pedicularis*, *Melampyrum*, *Euphrasia*, *Polygala*, are for the most part *Calcaris Donati*, or *Labiati*; the *Veronica* may be class'd in with the former, i.e. with the *Flowers*, which have more equal *Segments*. *Gentiana*, and *Centaureum Minus*, ought either to be join'd together, or immediately to follow each other, because of the Proximity of their *Characters*; *Facies externa Taste & Virtues*; all the *Saxifragæ's* are *Polypetalous*, except the *Aurea*, and therefore they ought to be dis-joyn'd. I suspect the *Lysimachia Lutea* has an *Unicap-sular Fruit*, and therefore it ought to be inserted immediately before, or immediately after *Anagallis Lutea*, and *Nummularia*; for though they differ in the *Facies Externa*, yet with *Tournefort*, I do reckon them to be near of Kin to each other.

3. The *Tricapsulares*, though they should agree in the *Fruëctification*, as it is plain they do not, yet its no small Task to place their Subaltern *Genera* aright, so as to make them agree in the *Flower*, *Leaf*, and *Root*. *Hypericum* has a *Tricapsular Fruit*, but *Androsæmum*

drosemum Maximum Wheeleri, is *Pentacapsular*, though none will disjoin it from its *Congeners*, only *Tournefort* makes it immediately to follow them, by the Name of *Acyrum*. I suspect *Chamecistus* is *Unicapsular*; *Pyrola Quadricapsular*, *Gramen Parnassi* is *Unicapsular*; as also *Viola Indica*, or *Cardaminum*, has three *Capsulae* indeed, but they are *Disjunctae*, and as it were in *Capitulum Congestae*; neither is it *Seminibus Pluribus*, for every *Capsula* has but one *Seed*. *Asarum* has an *Apetalous Flower*, and is *Hexacapsular*; so that there is none which agree with the Title in this Class, except *Campanula* and *Convolutulus*, and these not always neither; for the Fruit of the *Campanula*, as *Tournefort* observes, is sometimes divided into three, and sometimes into more *Pouches*; and likewise the *Convolutulus* is sometimes *Unicapsular*, and sometimes *Tricapsular*.

The *Tricapsulares Tricoctae*, viz. the *Ricinus* and *Tithymals*, answer the Title well enough; but why the *Quadricapsulares*, &c. and the *Leguminosae*, should interpose betwixt these and the other *Tricapsular* Fruits, I do not understand: but since they make up a whole Class of Flowers, called *Flores Liliacei*, I shall examine them when I come to *Tournefort's Method*.

4. *Quadricapsulares*. I am sensible *Ruta* has sometimes a *Pentapetalous Flower*, but whether *Stramonium*, which has a *Monopetalous*

noptalous Flower, does vary in the Number of the *Loculamenta*, I have not observ'd.

5. *Gerania* have indeed, for the most, a *Pentacapsular* and *Pentacoccous* Fruit; yet it's not the Number, but the Form of the *Capsulæ Caudatæ*, that make the *Genus* here. I think the *Ketmia* should have follow'd the *Malva's*, because of the same Flower; and that the Number of the *Capsulæ* in the *Ketmia* is indefinite, and not always the same; neither is the Number always the same in the *Cistus* nor *Balsamina*, nor is it to be class'd with the *Trifolium Acetosum*, upon any other account than the Elasticity of the *Pod*; and at that rate, *Cucumer agrestis* might be join'd with it also, which is a quite different *Genus*.

Lastly, Among the *Multicapsular Plants* we shall own, that *Aristolochia* and *Nymphaea* is so, but neither can *Papaver*, *Argemone*, nor *Linum*, be join'd with any of these, for they are plainly *Unicapsular*, having several *Placentæ* or *Lamellæ*, which disjoin the *Seeds*, but which do not unite at the Center, so as to make up different *Loculamenta* or *Pouches*.

1. The next that follow are the *Plantæ Siliquosæ*. And first for the *Multisiliquæ*. The *Seda*, *Cotylidon*, *Telephium*, *Pæonia*, *Helleborus*, *Caltha palustris*, and *Pseudo-Helleborus Niger*, *Flore Globoso*, or *Ranunculus Globosus*, may be all join'd together, because

because of the Figure of the *Flower*, but then *Aconitum*, *Aquilegia*, *Consolida Regalis*, should make up another *subaltern Genus*, because their *Flowers* differ from the former; To which may be added *Nigella*, because its *Fruit*, if not *Multisiliquous*, yet is *Multicap-sular*.

The *Siliquosæ*, *Unicapsulares*, *Bivalves*, which follow next, such as *Chelidonium majus*, *Papaver*, *Corniculatum*, as they are not *Papavers* because they are *Siliquosæ*, so they may be very well join'd with the *Tetrapetalæ Siliquosæ*, notwithstanding of the *Periantbium Bifolium Fugax*, *Raphanistrum*, *Hypocoon*, *Epimedium*, *Fumaria Sempervirens*, may be admitted here by the *Fructification*, though they differ very much by the *Flower*.

The *Siliquosæ Univalves*, such as *Gelse-minium Indicum*, or *Bignonia* of *Tournefort*, and *Clematis daphnoides*, differ very much in the *Flower*; *Apocinum*, *Periploca*, and *Asclepias*, resemble each other, though the *Species* of the *Apocina* do not agree among themselves in the *Fructification*, except as to their being *Pappescent* as well as *Lactescent*.

The *Siliquosæ Quadrivalves*; as *Lysimachia Siliquosa Chamenerion dicta*, and *Corniculata*, differ from each other, because the one is *Pappescent*, and the other not.

The

The *Regular Tetrapetala Siliquosæ*, agree so well together by the common Consent of all Authors, that it is, as it were, difficult to class them amiss; and yet the *Raphanus Rusticanus*, is plac'd among the *Plantæ Siliquosæ*, whereas it should have been plac'd next to *Cochlearia*, for its plainly a *Planta Siliculosa*, though I shall not, with *Tournefort*, make it a *Cochlearia*, because they differ so much in the *Facies externa*.

The *Tetrapetala Siliculosa*, differ so far in the Fashion of the *Pod* from each other, that their only Characteristick is rather in the Bigness than in the Figure. The hot pungent Taste peculiar to this Class of Plants, is a good enough distinctive Note, especially in such of them as are Water Plants, but there are some of the *Siliculosa* that are not pungent, as in the *Bursa pastoris*, for that reason called *Tblaspi fatuum*, by Mr. Ray.

The next Tribe of the *Tetrapetala Siliquosa*, called *Papylonaceæ*, or *Leguminosæ*, are easily distinguishable by their Taste, (called by Sir John Floyer, the Pea Bloom Taste) from all other kinds of Plants; so that its easy to class them together, though their distinctive Notes are not so very obvious; so that it is sometimes difficult to know which is a *Vicia*, an *Orobus*, &c. The *Lathyri* are easily discernible by the peculiar Figure of the Stalk; but there is no distinguishing the *Medicæ's* from the other *Trifolts* but by the Fruit,

which is also the surest *Note* to know how to distinguish each particular Species of the same *Genus*.

I know not, as I said before, why these *Tricapsular* Plants which follow the *Leguminosæ*, were disjoin'd from those formerly treated of. *Tournefort* calls these here *Lilliaceous Flowers*. I shall leave all these class'd together by him, and consider the *Genera* which follow such, as *Cyclamen*, *Orchis*, *Helleborine*, *Orobanche* and *Ophris*; as all of them differ much in the Flower, so they cannot be class'd here by their *Tricapsular Fruit*, that being for the most part *Unicapsular*, and opening at the top by one, two or three *Holes*.

All the *Bacciferae* agree together, in so far as they bear *Berries*, but they differ so much otherwise, that they can never be regularly class'd together, v.g. *Rubus*, both in *Flower* and *Fruit*, differs from all the other, its *Flower* being *Polypetalous*, and its *Fruit* *Aggregate*, it comes nearer to the *Fragraria* than any, only that the one is *Herbaceous*, and the other *Fruticosus* or *Shrubby*: It would likewise resemble the *Morus* in the *Fruit*, if the *Morus* had not *Apetalous Flowers* distinct from the *Fruit*. *Smilax* and *Bryonia Alba*, are *Bacciferae Scandentes*, and near of Kin to the *Pomiferae Scandentes*, both in the Structure of the *Flower*, and Manner of the *Fruetification*, and only differing from those in that Tribe by the Smallness of the Flower

Flower and Fruit. If any shall class *Christophoriana*, *Laurus Alexandrina*, *Lilium Convallium* and *Polygonatum* together, *per me licebit*; but methinks *Asparagus* comes but ill in betwixt these and the *Solana*; I should rather have chosen to have plac'd it first, because all the others have an undivided Leaf; or make it last of all, that all the *undivided Leaves* had been plac'd together, without the *intervention* of one whose *Leaf* is so deeply divided as the *Asparagus*; for though there be such a Disproportion among all these Plants, that they agree in nothing, save their being *Bacciferous*; so that its no matter which go before or which follow: Yet there are some kind of Decorum to be observ'd, even in the very placing of them; so that to place a *fine compound Leaf* amidst so many *simple ones*, would seem *incongruous*, unless by the Agreement of the other *Notes*, such as the *Flower*, &c. it were necessary to do so: v. g. Supposing all these *Bacciferae* to be planted successively in a *Bed*, and *Lilium Convallium* on the one hand, and *Alkekengi* on the other of *Asparagus*, none could think they were class'd together on purpose, before they had occasion to observe the *Fruit*. The like Regard should be had to the *Facies* of all Plants, in the disposing them in a Garden, provided there be no Irregularity introduc'd in the *Characteristicks* by so doing.

The *Pomifera Scandentes*, such as *Cucumbers*, *Pompions* and *Melons*, are a very distinct Class. For the *Ficus Indica*, *Cereus* and *Ficoides*, it is not long since there were many Species of them here in *Europe*; but now that they have encreas'd to be a numerous Tribe, known by the general Name of *Succulent Plants*, they may be very well describ'd into several *Genera*, and dispos'd near to those with whom they agree in *Characters*, v. g. some to *Aloes*, some to *Seda*, some to *Tithymals*, some to *Asphodels*, and some have been plac'd along with the *Starwort Plants*; most of the *Ficoides* have some Resemblance to a *Radiate*, and sometimes to *Semiflosculous Flowers*. I wish the ingenious Mr. *Bradly* would continue in publishing the *Figures* of these *Succulent Plants*, as they are brought home, since they can be so lively express'd in *Copper Plates*, and since there is no Possibility of preserving dry Specimens of them.

The last Class is the *Herbæ Flore Stamineæ*, seu *apetalæ*, *Pimpinella Sanguisorba*, *Plantago* and *Amaranthus*, are deservedly remov'd from among these by Dr. *Tournefort*. To these are added the *Herbæ Juliferaæ*, as *Calamus Aromaticus*, *Equisetum*. In *Clavem Dispositæ*, as *Typha*; *Aspergillum imitantes*, as *Sparganium*. After them do succeed the *Capillares*, or *Epiphyllispermæ*; and next to these the *Frumenta* and *Gramina*.

The

The Trees are class'd after the same manner with those of Mr. Ray, as the *Coniferæ*, *Resiniferæ* & *non Resiniferæ*, *Nuciferæ*, *Glandiferæ*, *Bacciferæ*, *Lanigeræ*, *Vasculis Foliaceis*, as *Ulmus*, *Acinis Coagmentatis*, as *Morus*.

The next Class is the *Pomiferæ*, *Umbilicatæ*, *Polypyrenæ*, *Bacciferæ Polypyrenæ*, as *Rosa*, *Grossularia*, *Vitis*, *Myrtus*, *Vitis Idæa*: But as all the other have *Succulent Berries*, I know not how the *Rosa* comes in here *Dipyrenæ*, *Monopyrenæ*, *Pomiferæ non Umbilicatæ*, *Polypyrenæ*, *Malus Aurant.* &c. *Pruniferæ*, as *Malus Armeniaca*, *prunus Cerasus*, &c. Then follow the *Bacciferæ Variæ*, as *Monopyrenæ*, &c. *Arbores Fructu Siccò*, *Monococco*, *Tricapsulari*, *Monospermo*, *Membranaceo Foliaceo Alato Seminibus Lanuginosis*; and last of all the *Arbores Siliquosæ*.

Thus I have briefly class'd the Trees, according to the Fructification in Mr. Ray and Herman, for Morison's Disposition of Trees was never published.

These are the Three, whose chief Design was to class the Plants by the Fructification, which though none of them have so closely adher'd to that Method as they might, yet they have set it on such a Footing, as with a very little Labour and Pains, by a few *mutatis mutandis*, it may be brought up to a good Perfection.

Dr. *Morison's* Business was to reduce the several Species into their proper *Genera*; and a great and laborious Work it was, considering how few Precedents he had before him. Mr. *Ray*, in his *Methodus Emendata*, has assign'd very handsome *Characteristicks* to each *Genus*: In which he had no small Assistance from *Rivini* and *Tournefort*; and he would have seem'd more *Methodical*, if he had not taken in too many Parts of the Plant to his Assistance; and Dr. *Herman's* first Design seems to have been to rectify Dr. *Morison's* *Method*, but he has done it so, as rather to make up a new *Method* than to correct an old one; it has a greater Regard to the *Fruit* than the other two, but it does not want its own Incoherencies and Inconsistencies, as has been shewn.

Rivini's Method.

I consider in the next place such Methods as class the Plants by the Flower, and usually distinguish them by the Fruit; *D. Augustus Quirini Rivini*, 'Professor of Natural History at *Leypsick*, is the first who thought upon this way of doing. He, observing that the Flower is the most conspicuous Part of the Plant, and as it always appears before the *Fruit*, so it is the first Token we receive, that such a Plant is of such a *Genus*; and being allur'd by their Beauty, was tempted to take their Figures and engrave them, where observing what correspondence

respondence there is betwixt the *Flowers* of the *same Tribe*, he doubted not, but by ranking them together, he could dispose of them into a very regular and orderly Method, and make their *Genus* be known before it could be discern'd by the Fruit. His Figures are elegant and fine, and the Specimens are drawn in their natural Bigness, by which if he should perfect the whole Method, it would be a large and expensive Undertaking. But as it is too much for a private Pocket to bear, and as there will be few to purchase Books of *Botany* of so large a Price, I'm afraid he will be oblig'd to give over his Design before it be half finished.

He classes the Flowers, 1. According to their *Figure*, in which respect they are either *Flore Regulari*, or *Irregulari*. 2. In respect of the Number of their *Petala*. Thus they are *Flore Monopetalo*, *Tetrapetalo*, *Pentapetalo*, and *Hexapetalo*, each in a separate Volume, whereof the first three are published, but the fourth has not come abroad yet, by what I can understand. As it is difficult to class so many Plants as there are now known under so few General Heads, so by this Method several Inconsistencies of separating must needs follow, such as the establishing of certain *Notes* for *Characteristick*, which are not always to be had in the same *Genus*, and perhaps not in the same Species. Some Species of the *Valeriana*, which is first of his *Mono-*

petalous Class of Irregular Flowers, have the Flowers divided into equal, and some into unequal Segments; and some of them are *Calcaridoti*, like the *Delphinium*, and some not: Shall either of these, which thus vary in the several Species, be accepted of as a *Characteristick Note*, to constitute the whole Genus? *Valerianella* also in several Plants of the same Species, has Flowers with some equal and some unequal Segments, for all which it is not to be separated from its *Congener Valeriana*: For as *Jungius*, *Ray*, and *Knant*, (of whom hereafter) define a *Regular Flower* to be that, whose *Petala* or *Segments* do not so much agree in the Bigness, as in the Figure and Situation, so *Rivini*, in his *Introduct. in Rem Herb.* will have the other *Qualification* too, viz. that the *Petala* and *Segments* must also agree in the Bigness, that the *Stylus* be in the Center of the *Flower*, and that the Number of the *Stamina* be proportionable to the Divisions, or the Number of the *Petala*; as also that the *Calix* or *Perianthium* be *Regular*; so that it is most easy to determine concerning the *Irregularity* of *Flowers*, according to *Rivini's Definition*; insomuch, that if there be the least swerving from this Rule of determining of *Regular Flowers*, then it must needs be *irregular*: By which means he must needs expose himself to great Inconveniencies in determining of the *Flowers*, v. g. In what inextricable Difficulties does he involve himself,

Self, about the *Gerania*, *Pyrola*, *Tithymals*, *Seda Bicornia*, *Malva*, *Alcea* and *Lysimachia*, among the *Siliquosæ*; whereof some Species have a *Regular*, and others an *Irregular Flower*? And if the *Seda Bicornia*, as *Tournefort* has rightly distinguish'd them, are to be divided into *Saxifraga*, which is exactly *Regular*, and *Geum* whose Flowers are not always *Regular*, because they have sometimes an *Hiatus* on one side, and have not the *Stylus* in the middle; as also the *Petala* in the upper Part are bended outward, and in the lower they are bended inward, or are concave, by which they make an unequal Surface; so that these *subaltern Genera*, according to him, cannot be well join'd to the principal *Genera* of the same Class; the *Stylus* of the *Alcea Vulgaris*, is not plac'd exactly in the middle, shall it therefore be separated from the *Malva*, of which every one knows it to be a *subaltern Genus*? Most of the *Europæan Gerania* have a *Regular Flower*; but the others, especially the *African Gerania*, have an *Irregular Flower*. This is observ'd by *Rivini* himself, and he seems to distinguish them by their *principal Genera*; therefore he calls the one *Geranium*, and the other *Gruinalis*. He reckons these *Gerania* which chiefly agree in the *Fruit*; for he says, the *Gerania* have *Semina Nuda*, but the *Gruinalis* has *Semina Vasculis inclusa*. I shall not dispute that with him, though it be the com-

mon Opinion, that all the *Gerania* have *Vascular* Seeds, *Geranium Cicutæ fol.* has almost *Regular Flowers*, has the *Semina Caudata*, and yet in *Rivini's* Sense, they are to be look'd upon as having *Irregular Flowers* and *Naked Seeds*. *Geranium Robertianum* has *Regular Flowers*, and not *Semina Caudata*, upon which account they are rather *Naked Seeds* than the other: So that it ought not to be a Species of *Gruinalis*, according to *Rivini's* Maxime. *Geranium Fol. Malvæ*, and *Columbinum*, seem in any respect to have *Regular Flowers*; and according to the Sentiments of *Ray*, *Herman* and *Tournefort*, they have the *Vascula Rostrata*, *Pentacocca*, so that they ought not to be separated from the other *Gerania*. The *Pyrolas* are join'd with the *Irregular Flowers*, and a *Vascular Fruit*, and yet by the excellent Figures he gives of them, they are all *Regular*, having nothing of *Irregularity* about them but the *Stylus*, which he compares to the *Proboscis*, though in some Species it is streight and short, as in the *Pyrola Arbutifol.* The *Tithymals* have their *Petala Regular*; and although the Weight of the *Tricoccous Fructus Rudimentum*, which hangs about the middle of the *Stylus*, makes it to incline to one side, yet the part of the *Stylus* which is stretch'd forth without the middle of the Embryo, is regularly plac'd, being usually divided into three Parts in the Center. *Lysimachia*, *Siliquosa*,
Chamene-

Chamenerion dicta Species, are by him among the *Irregular Flowers*, though there be nothing of *Irregularity* about them, only that the *Long Stylus* hangs on one side, before its Extremity is spread forth into four *Segments*; but after that, generally speaking, it keeps the Center; and whether it be spread forth or not, it always arises from the middle of the Pod, being surrounded by the several *Stamina*, which forming an Arch in the bottom of the Flower, make up an empty Space for receiving the *Farina*, as we shall observe hereafter.

Lychnis Sylvestris, Quæ been *Album Vulgo*, has *Irregular Flowers*; and yet most of the Flowers of the other *Lychnis's* have their Flowers *Regular*. *Campanula Africana*, *Erini Facie Flore Violaceo*, *Cauliculis Procumbentibus*, *Herm.* has *Irregular Flowers*, and yet all the other *Campanula's* are *Regular*. And if we strictly observe *Rivini's Rules*, what can we certainly determine concerning the Flowers, *Ulmaria*, *Belladonna*, *Solanum*, *Nicotiana*, *Lyfimachia*, *Salicaria* and *Erica*, kinds of *Opulus*. In the *Umbelliferous Class* some have *Regular Flowers*, and others *Irregular*, as in *Spondylium* and *Coriandrum*. The *Verticillate* Kind are for the most part *Irregular*, yet the Flowers of some *Species* of *Mentha*, and both the *Species* of the *Pulegium* (for which they are join'd to the *Mentha*) and *Lycopus* or *Marubium Palustre*, *Glabrum*, have their Flow-

ers Regular; infomuch, as *Tournefort* fays of them, fpeaking of the two *Lips*, *Sic tamen ambo fecantur ut flos quadripartitus primo aspectu videatur*: ^a And of *Lycopus* he fays, that it is *Flore Monopetalo fed labiato & quodammodo campaniformi*; *labium enim fuperius vix diftingui potest à partibus inferioris*, *adeo ut primo aspectu flos quadripartitus videatur*. ^b That is, "It has a Lip, and "almost Bell-flower, for the upper Lip is "fcarce to be diftinguifh'd from the lower; fo "that at the firft View it feems to be divided into four equal Parts." And yet none will feparate thefe two from their *Congeners*. And again, *Echium* has plainly an *Irregular Flower*, and yet none will juftly feparate it from its *Congeners*, *Borrago* and *Bugloffum*, when they confider by its rough alternate *Leaves*, and all the *Facies externa* of this *Genus*, it can never be join'd to the *Verticillate* or *Lip-flower'd* Plants, notwithstanding it has four Seeds fucceeding to each *Flower*, in common with the others of that Clafs; and if this Difinction of the *Regular* and *Irregular Flowers* be ftrictly obferv'd, what fhall become of the *Flores Corymbiferi Compositi Difcoides* and *Semiflofculofi*, of *Tournefort*, where fome of the *Flofculi* and *Semiflofculi* have the Borders divided into *equal Segments*, and others nor? And where the *Capillamentum* of fome is in the Center of the *Flower*, and

^a Tournef. Inftit. p. 188.^b Ibid. 190.

others

others not certainly, this would create a great Confusion, and make the several Species of the the same Genus to be separated from it upon every trivial Occasion.

The next part of this *Method* depends upon the *Number* of the *Petala*. If this be had any great regard to, what an Uncertainty would it introduce in several *Genera* of *Plant*s, already determin'd by the common Consent of all *Authors*, v. g. In the *Papilionaceous Flowers*, they are generally look'd upon to be *Tetrapetalous*, consisting of two *Alæ*, or Wings, like those of a *Butter-flye*. The *Vexillum* spread forth aloft, and the *Carina*, making up the lower part of the *Flower*, in Shape like the fore-part of a small *Boat*; for these *Flowers* are so small in some *Species*, as in the *Lagopus* and *Melilotus Minima*, that their *Number* can scarce be determin'd; and where the *Flower* is large enough, some of them are *Pentapetalous*, with the *Vexillum* divided into two other *Monopetalous*, as *Trifolium Vulgare* & *Montanum Purpureum*; and if the *Trifolium Pratense Album* be strictly examin'd, it will be found to be *Dipetalous*; nor has the *Number* of the *Petala* in the small flower'd *Medica*s, been yet determin'd: I suspect most of them will be found *Tripetalous*, and so in several small *papilionaceous Flowers*, as *Ornithopodium*, &c. Let any consider what *Tournefort* advances concerning these *Trifol*s, as also concerning the
Limonium

Limonium^a. He places it among the *Poly-petalous Class*, and among the *Flores Caryophyllæi*^b, and yet in the fore-cited Place, he says he found two *Species* of *Limonium*, with *Monopetalous Flowers*, viz. *Limonium Hispanicum frutescens portulacæ Marinae fol.* and *Limonium Hispan. multifido fol.* but he did not think fit to separate them from their *Congeners*; and he is in the right, not to determine the Number of the *Petala* in the *Ranunculus*, *Pulsatilla*, *Clematis*, and the like. *Tormentilla* has for the most part four *Petala*, but I have often seen it vary into five; and shall it be separated from the *Pentaphyllous Class*, purely because of the Number of its *Petala*? The Number of the *Petala* in *Balsamina*, is uncertain, and some of the *Fumaria's* have *Bipetalous*, others *Tetrapetalous Flowers*. Many other Examples could be produc'd to prove the Instability of this *Method*, either in respect of the *Regularity* of the *Flower*, or Number of the *Petala*; but I shall leave them at present, since I shall have occasion hereafter to speak of this Subject, when I come to *Tournefort's* and *Knaut's Methods*.

Volkhamer's Method.

The next *Method*, which in order of Time was publish'd, was *Volkhamer's*, in his *Flora*

^a Ifagog. in Rem. Herb. p. 62. ^b P. 342.

Nuremburgensis. He's a learned and modest Author, and what he advances is with great Judgment; he has not made any *Methodical* Disposition of the *Plants*, but treats of them *Alphabetically*; upon his entring into any new *Genus* in the *Catalogue*, he gives the *Characteristicks* of *Morison*, *Ammannus*, *Ray*, *Herman*, and *Rivini*, in so far as his *Method* was then publish'd. He at last gives his own *Generical* and *Specificical* Notes, when he begins with the *Seed*, after that the *Seed-Vessel*; from thence he considers the *Flower*, and then goes on with the *Stalk*, *Leaf*, and other less essential Parts of the *external Habit* of the *Plant*. He seems more inclin'd to class the *Plants* according to the *Fructification*, than the *Flower*, and is a very strict Examiner of the *Seed*, which he rather inclines to make the *Characteristick Note*, than the *Seed-Vessel* or *Fruit*; and although, as I said, he do's not dispose the *Plants* into any *Method* himself, yet by what Account he gives of the *Seeds*, *Seed-Vessels*, and *Flowers*, he has trode out a very good Path for such as have a mind to *methodise* *Plants* after him.

The noted and celebrated Dr. *Pitton Tournesfort*, Fellow of the *Royal Academy of Sciences*, and *Botanick Professor* of the *Royal Garden* at *Paris*, is the next, who according to the Series of Years, undertook to establish a new *Method*. He was one who had an
early

Tournesfort's Method.

early *Genius* for the Knowledge of the *Vegetables*, and when his Parents design'd him for other Studies, nothing could withdraw him from enquiring after the *Plants*: His great Assiduity, and serious Application towards the Science of *Botany*, soon advanc'd him beyond the reach of the ordinary Set of Herborisers, nor was it long e'er his Fame reach'd the Ears of the *French Court*; and happy was it for that *delightful Science*, that Monsieur *Fagon*, one of the chief Physicians to the *French King*, had such a Taste of *Botany*, as to be capable to judge of, and to encourage such as had made any considerable Advancements therein. This made him seek after *Tournefort*, when *Tournefort* scarce had Time to seek after him, and to raise him to the *Highest Pitch* of Preferment the *Cultivators* of that Science are capable of: How great is the Advantage which the *Liberal Arts* and *Sciences* reap, when they who are deservedly distinguish'd for their Knowledge in them, are encouraged, and receive suitable Rewards from Princes, Potentates, and other great Men upon the Earth? And how much do these fade, languish, and decay, when the Cultivators and Improvers of them, instead of being encouraged, are undervalued and set at nought every where? Nor did Dr. *Tournefort* prove unworthy of so great a Station; he with the utmost Earnestness prosecuted those considerable Discoveries and Improvements he formerly had

had made in the ocular Inspection of the *Plants*, by which he added a great many particular Observations to those of other *Botanick Authors*. The first thing he publish'd, or was publish'd in his Name, was the *Schola Botanica*, and being oblig'd to read *Botanick Lectures* in the Royal Garden, during the *Summer-Season*, he began to rank or class them according to the Similitude and *Affinity* of the *Flowers*, they being the first and chief conspicuous Parts of the *Plants*; and thus, by placing and displacing them from one Season to another, he at length thought he had brought them to a suitable Conformity: Upon which, after making Application to his Patron Dr. *Fagon*, he was encourag'd to take the Figures of the *Flowers* he had observ'd, and to dispose of them as he thought fit; nor did his Curiosity stop at the *Flowers* alone, he also takes notice of the proper *Fruit*, *Seed* and *Seed Vessel*, belonging or succeeding to each particular *Flower*; and thus compos'd his *Elementes Botaniques*, where if he had not been earnest to dispose of the *Plants* after so singular a manner; and had he us'd greater Endeavours to conform himself to the Dispositions of others in several Cases, he had done more for the Advantage of *Botany*, than by following his own Scheme so closely as he did: for there are several Inconsistencies in his *Method*, not only in his imaginary Classes, and unheard of Figures of the *Flow-*

ers,

ers, but also in the Disposition of them, by making those which have no Resemblance succeed to each other; and it had consisted more with his Reputation, if he had made some Alterations, of which he could not but be sensible they were necessary when he publish'd his *Institutiones Rei Herbariæ*; but the Plates were engraven, they could not be alter'd without undoing most of what he formerly had done, and the *Method* was already established, which he knew not well how to change, without bringing the Students of his *Elementes Botaniques* into Confusion; therefore he was oblig'd to let it go on as it was begun, and let his Successors do with it what they had a mind. The fourth *Botanick Treatise* he wrote, was his *Histoire des Plants aux environ de Paris*, in which he has shewn a great deal of clear and judicious Knowledge of *Plants*. His Criticisms are true and just: The Mistakes of ancient Authors in the Figures and Descriptions, are modestly and impartially corrected. His own Descriptions of the *Plants*, when he gives any, are clean, neat, and distinct, nor can there be any thing done with greater Exactness. The Virtues of the Medicinal *Plants* are consonant to long and known Experience; and as to the *Analysis*, he every where gives that upon the Authority of the other Members of the *Royal Academy*, who it seems have registred all the Chymical Experiments made upon the *Plants*.

His

His Corollary is the effect of the three Years Voyage he made to the *Levant*, at the *French King's* Charges, where he has added 1100 different, new, formerly unknown Species, and constituted several new *Genera*. These are all the Writings publish'd by that great Man during his Life, besides those most valuable Volumes of his Voyages, which have been published since his Death, and which 'tis probable might have come abroad with far greater Advantages had he liv'd to perfect them.

Tournefort, as is usual by all those who establish any new *Method* in their *Præludia, Præcognoscenda, &c.* begins with an *Isagoge*, wherein he enumerates the several *Botanick Authors*, and shews the *Origine* and *Progress* of that *Science* throughout all Ages. Then he proceeds to explain the several Parts of the *Plants*; after which he goes on in laying down the several Rules whereby to constitute a *Method*.

He says, that all the Parts of a *Plant* are not to be admitted, in order to an exact Distribution of the *Plants* into a *Method*; but a certain Number, which cannot amount to five; such as the *Root, Leaves, Stalks, Flowers* and *Seed*. For so many together would rather tend to the Destruction, than better Establishment of any certain *Genus*; therefore the Generical Parts of a *Plant* are only to be pick'd out among some of them, four is too many; for then 'tis to be suspected that an
Affinity

Affinity would rather be wanting than found, both in the *Species* hitherto known, and those to be found out. Neither are the Generical Notes to be taken from one part of the *Plant*, such as the *Leaves*, for then there would arise a great Confusion among those which have simple *Leaves*, *v. g.* whether they be smooth or rough; how they are plac'd, whether upon the whole *Stalk*, or at the bottom; whether alternately, or by Pairs, and what a Disorder would *Plants* be brought into, if all these which have a divided *Leaf* were join'd together.

Nor 2, is the *Characterislick* to be taken from the *Flower* alone, for then would the *Cucumbers*, *Melons*, *Pompions*, be join'd with the *Campanula's*, and *Convolvulus*, &c. which would be far out of the Road. Neither 3, can the *Seed* do it, for then would all the *Verticillate Plants*, *viz.* *Mentha*, *Melissa*, *Marrubium*, &c. make up but one *Genus*, &c.

Having therefore considered each single part of the *Plant*, he is of Opinion it must require two or three at most of these Parts to be join'd together by different ways for setting aside the *Stalk*. The *Roots* may be join'd either with the *Leaves*, or the *Flowers* with the *Fruit*. The *Leaves* may be join'd with the *Flowers* or with the *Fruit*; and lastly, the *Flowers* may be join'd with the *Fruit*, for the Conjunction of the *Root* with the *Leaves*,
and

and without any other part, can be of no use; nor can the *Root*, either with the *Flower* or with the *Fruit*, and therefore the true *Method* of constituting the *Genera*, must be by the *Flower* and *Fruit* together: He therefore lays down these three general Positions.

1. That there should be an exact *Method* in the Denomination of *Plants*; lest there be as great an Abundance of Names of *Plants*, as there are of the *Plants* themselves, which must needs happen, if every one take the Freedom to impose a new Name upon every *Plant*.

2. That all the *Plants* having the same *Facies Externa*, are not to be reckoned as belonging to the same *Class*, v. g. The *Herba Trinitatis Fuchsis*, is a *Viola*, though it have not the *Leaves* of a *Viola*. A *Mallow* can never be a *Betony*, though there be some *Mallows* with *Betony Leaves*. How many *Plants* are there which come from *Africa* with the *Leaves* of *Malva*, *Alchymilla*, *Myrrhis*, *Coriandrum*, which when they push out the *Flower*, and begin to frame the *Fruit*, shew themselves to be *Gerania*.

3. We should be oblig'd to impose new Names upon *Plants*, different from what our Predecessors had given them, if there were only regard had to the *Root* and *Stalk* for constituting the *Genera*. Thus the *Ranunculi Aconiti*, *Plantaginis*, *Graminis Fol.* &c. would be no more *Ranunculi*, if no regard is to be had to the *Flower* and *Fruit*.

Therefore the following Rules are observ'd by him, not as perpetual, because some Allowance must be given to Use, and the several Opinions of *Botanists*; but such as he, is not inclin'd to depart from but very seldom, and that for very weighty Reasons.

1. That the *Plants*, which have neither a conspicuous *Flower* or *Fruit*, are to be distributed according to their other principal Parts, as well as if they had both.

2. A particular Regard is to be had to both *Flower* and *Fruit*, in the Distribution of such *Plants* as have them, since both Nature and Custom directs us to them.

3. We must adhere to the *Flower* and *Fruit* together, since they are fully sufficient to constitute the *Genera*.

4. Not only all the other Parts of the *Plants*, but also whatever else belongs to them, such as *Taste*, *Smell*, *manner of growing*, may be call'd in for Assistance, when the *Flower* and *Fruit* are not able rightly to distinguish the true *Genera*.

5. In order to throw out what may be superfluous, Enquiry is to be made whether such a *Genus* would be chang'd by so doing; for as nothing should be added to the *Flower* and *Fruit*, unless the *Genus* cannot be distinguish'd otherwise, so other Parts may be admitted if Occasion require it, *v.g.* *Populus* differs only from the *Salix* by the *Facies Externa*, and *Fœniculum* from its *Congeners*, by the

the fine Division of the *Leaves*, and *Helianthemum* from *Telephium*, by the *Leaves* arising in Pairs from the Joints of the *Stalk*.

6. The *Etymology* of the Names of *Plants* is not to be regarded, v. g. *Chamædrys* is so call'd from the Resemblance they thought one *Species* of it had to the *Oak*, for the Word imports a dwarf *Oak*, from χαμαι & δρυς, as if it should be call'd *Quercus Humilis*; but this do's not hinder the *Scordium*, and *Scordio Affinis*, or *Salvia Sylvestris* to be a *Species* of it, for this last *Plant* cannot be a *Salvia*, because it has not the same *Flower* and *Fruit*; neither would it at this rate be a *Chamædrys*, because it has not an *Oak Leaf*.

Tournefort is averse from admitting of the *Summa Genera*, and *Subaltern* ones; but I am not of his Opinion; for the disposing of *Plants* so, is a great Assistance to make a clear Distinction of them in some Cases, v. g. *Malva*, *Malva Arborea*, *Althæa*, *Alcæa*, are all of the *Malvaceous Kind*, and yet no Person will say they are the very same *Genus*; but if *Malva* be admitted to be the *Summum Genus*, then *Althæa*, *Alcæa*, &c. may very well be accepted of as *Subaltern Genera*. If *Pentaphyllum* be receiv'd as a *Summum Genus*, then *Tormentilla*, *Argentina*, *Pentaphyllum Palustre*, are *Subaltern Genera*; for none of these can be called *Species* of the *Pentaphyllum*. If *Ranunculus* be a *Summum Genus*, how many *Subaltern Genera* belong to

it? *Anemone*, *Chelidonium Minus*, *Hepatica Nobilis*, because of its relation to the *Chelidonium*; all these in the *Flower* and *Fruit*, are *Ranunculi*, and yet they are *Subaltern Genera*, most of them having several *Species* belonging to them. How many *Subaltern Genera* do there belong to the *Geranium*, as *Batrachoides*, *Columbinum*, *Robertianum*, and several others, all which have their separate *Species*? However, this Liberty is not to be abus'd, for there may be an Error, in multiplying either the *Genera* or the *Species*, as well as in making too few of them.

The Science of *Botany* is so very extensive, *Plants* may be so variously distributed, *Non descripts* which are daily brought from Abroad, are so numerous, and their *Characters* are so often different from the *European Genera*, that there is enough to do with all the *Divisions*, and *Sub-divisions* which can be invented, in order to bring them into a regular *Disposition*, and therefore that *Quadruple Distinction* of *Tournefort's* into *Class*, *Section*, *Genera*, and *Species*, seems to be one of its greatest Advantages, and preferable to that of *Genus primum*, *secundum*, &c. and after them the *Subaltern Genera*. For according to *Tournefort's Method*, *Malva* becomes the *Section* of a *Class*. *Althæa*, *Alcea*, &c. are several *Genera* of this *Section*, yet still there is need for another Division, viz. The four first *Genera* are, *Flore* & *Fructu Malvæ*, and they are distinguishable

able by the *Calix*, or *Perianthium*, as shall be shewn hereafter; but there are four more *Genera*, which though they agree in the *Flower* with the *Malva*, yet they differ in the *Fruit*. Now if these cannot be rightly distributed for want of proper *Subdivisions*, when they are already branch'd out into four, how much more are *Subdivisions* necessary, when they are only divided into *Genera*, where the Number infers no Dependence upon one another?

To *Class* a *Plant* then, is to fix upon one particular part of the *Plant*, by which all kind of Vegetables, where such a part is to be had, is to be denominated, v. g. If the *Flower* is the part pitch'd upon, by which the *Plants* are to be class'd, then all the *Classes* throughout the whole *Method*, are to be denominated by the several *Flowers*. If the *Fruit* be the *Character*, then all the *Classes* are to receive their *General Title* from the *Fruit*, and so of the *Seed*, &c. This to me seems the readiest way to avoid the Confusion of *classing* by several other Parts of the *Plant* in the same *Method*. I shall not determine whether the *classing* by the *Flower*, or by the *Fruit*, be most consistent with the *Leges Naturæ*; but the *classing* by one part of a *Plant*, rather than by many, seems to be the more Uniform of the two, if the *Nature* of the thing will bear it.

Our *Author*, *Tournefort*, prefers the *Flower* to the *Fruit*, or any other part of the *Plant*, and his Reasons for it are, That as his *Method* has the Advantage of all others, by being simple, it can immediately lead one to the Knowledge of the Name of a *Plant*, for having found the *Class*, the Knowledge of the *Genus* is soon found out, and that being known, the Description of a *Species*, formerly unknown, will be easily learnt, and a *Non-descript* can easily be reduc'd to its proper *Genus*: This is the shortest way to arrive at the Knowledge of *Plants*——But if there be a regard had sometimes to the *Leaves*, *Flowers*, *Stalks*, and *Roots*, whereto shall he who is ignorant of any *Plant*, have his Recourse? It is plain therefore, that the *Classes* of *Plants* ought only to have one *Foundation*, and That, ought to be one of the Parts by which the *Genera* of all the *Plants* are to be constituted, in the which the *Flower* ought to be prefer'd to the *Fruit*; for at the Examination of the Structure of the *Flower*, one may immediately, or within a few Days, come to the perfect Knowledge of the *Fruit*; yea, by the transverse cutting of the *Pistillum* or *Calix*, the Nature of the *Fruits* is easily known to those who are exercis'd in that way of doing; after which the Character of the whole *Genus* may be found out in a more succinct manner——But if the *Fruit* be requisite for constituting a *Class*, the next Season another

ther must be waited for, before the other part of the *Character* of the *Genus*, to wit, the *Flower* (which after the *Fruit* is ripe, withered and dry'd up) can be found out.

Therefore, in the constituting of a *Class*, the *Flower* alone must be us'd as the *Key* and *Foundation* of *Botany*, in such *Plants* as have a *Flower*. In constituting of the *Genera*, the *Flower*, together with the *Fruit*, is requir'd; and in constituting of the *Species*, several other of the *Parts* may be admitted.

Being come to the *Method* it self, he first divides or distinguishes the *Plants* according to their *Structure*, in which respect they are either *Herbaceous*, or *Ligneous*. But whereas they are commonly distinguish'd into the *Arbores Frutices*, and *Suffrutices* which make up the *Ligneous*, and *Herbæ*, which make up the *Herbaceous* Part, he only chuses to use a two-fold, instead of the former four-fold *Distinction*, so that the *Herbæ* and the *Suffrutices*, and the *Frutices* and *Arbores* go together, not because he is not sensible that the *Suffrutices* have a *Ligneous* Substance, and a perennial Surface (for most of the *Suffrutices* are Evergreens) and are even *Gemmiparæ* in their woody Part, as much as the *Shrubs* and *Trees* are; but because of their low Stature and short Duration, and because to rank them separately would create a Disturbance in that Symmetry and good Order in one of the most fix'd *Classes* in all the *Botanicks*, for who would separate

Rosmarinus, Lavendula, Hyssopus, Thymus, from *Majorana, Mentha, Melissa*, without greatly dismembring of that Tribe; and who would be at Pains to separate *Abrotanum Mas*, from *Abfynthium*, if there were no more in't than that the one has a woody, and the other an *Herbaceous, Medullary Stalk*?

2. In respect to their Flowerings. Thus the *Herbs* are divided into such as have conspicuous *Flowers*, and such as has have them not; or into the *Floriferous* and *Non-floriferous Plants*. The *Floriferous Plants* are, either *Monopetalous, Polypetalous, or Apetalous*. The *Non-floriferous* are such as have no *Flower*; but as the *Capillares* have a *Seed-Vessel* and *Seed*, and such as have neither *Flower* nor *Seed*, as the *Musci, Fuci, Fungi*.

The *Trees* are divided into five *Classes*, viz. *Flore Apetalo, Amentaceo, Monopetalo, Rosaceo, Papyllonaceo*, so that in few Lines you have the Distribution of all the *Plantarum Genera* expos'd to View.

When he comes to the *Classing* of the *Plants*, he disposes of them according to such Shapes and *Figures* as are imagined by himself. But as the *Plants* themselves will not admit of such Distributions without a great many Inconsistencies, so he has been expos'd to the Censure of several *Authors*, since his *Institutiones* have been published upon that account; and so much the more, in that he puts so great a Value upon his own *Method*.

So that I suspect what he accuses Dr. Morison
of, will more truly be applicable to himself,

“ Summis laudibus excipendus, longè vero

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slender, and that it is only moist for the first Year, and dry always thereafter. And Mr. *Bradley*, who says “ ’tis made up of little “ transparent *Globules*, like Bubbles which “ compose the Froth of any Liquor: For we may suppose that the Pores of the Root of the young Tree or Shoot, proceeding from the extended *Oculus* or Bud, are at first very open, that the grosser Particles which compose the Pith, not being so subtile as those whereof the ligneous and cortical Fibers are compos’d, are thrown aside towards the Center; and make up a soft Substance, which by being loose and incoherent, easily yields, and gives way to the additional *Strata* of the *Ligneous Fibers*. But this Pith is very useful at the beginning, by keeping the young and tender Twigs so flexible that they bend and yield to every Blast of Wind. Whereas were they firm and hard (which they would be without this Pith) they would be ready to break; and in this they are analogous to Bones, which were it not for the Marrow, would be easily fractured by a very slight Accident.

The annual Surface of the Tree comes next to be considered. As the Seed contains the *Primum Principium* of the whole Plant, so the *Buds* contain the first Lineaments of the several Parts belonging to the *annual Surface*. They are three-fold: 1. The *Oculus*, *Gemma*, or *Bud* for the *Wood*. 2. For the *Flower*; and 3. For the *Leaf*. These for the *Wood*
are

are usually at the Extremity, and sometimes at the Sides of the last Year's Shoot, especially at its lower part, when they with the Leaves are alternately plac'd; for when they are situated by Intervals, or in Pairs, then the *Oculi* for the Wood are always at the Extremity, where they as it were padlock the Shoot, so that it can be stretch'd to no greater Length. When the Shoot is strong in a good Soil, sometimes two or more of these *Wood-Buds* will be put forth, and sometimes the Bud for the Leaf will become a Bud for the Wood, as Mr. *Fairchild* observes. These for the Flower are mostly at the lower part of either the last, or the Shoot of the Year before that. For Gardiners observe, that generally speaking, they are two Years in forming. These for the Leaf do proceed *è Foliorum Alis*, at the Root of the Pedicle for the Leaf of the last Year. After the Winter Solstice is over, when the Sun begins to return towards our Horizon, the Particles of the Earth ascend more freely, the common *Tubuli* in the Bark begin to be dilated, and the several *Gemmae* by degrees are expanded and spread forth.

As the *Stolones* or *Shoots* are added every Year, so they always remain, unless they be accidentally or designedly remov'd before the Tree is fell'd. Some Trees only put forth one Shoot in a Summer-Season, as the *Peach-Tree*, &c. but the generality of them put forth

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forth two, the *Vernal* and the *Autumnal*; the *Vernal* is lengthened from the beginning of the Expansion of the Bud in *January*, to about the latter end of *May*, or beginning of *June*, when it ceases. This is call'd the setting Time, and is more late or early, according to the Soil or Season. Every Shoot partakes of three different Substances, the Bark, which is very thin, one *Stratum* of Ligneous Fibers; and the Pith, which in some such as the Elder or *Sambucus*, makes up the greatest part. When the Shoot is fully set, there are a few more *Strata* added to the Ligneous Fibers, the Bark is proportionally thickened, but the Capacity of the Pith is lessened; and now it is that the Fibers of the Root are also extended; for no sooner do the Shoots cease to lengthen, than the Fibers of the Root are stretch'd forth. Now it is also, that the several Buds for the ensuing Year begin to be form'd. In the Month of *July* Preparation is made for the second Spring. This stretching forth of the Fibers of the Root in the Summer, has hitherto been but little observed, though I am credibly inform'd by that accurate and expert Gardiner Mr. *Thomas Fairchild* at *Hoxton*, that a Tree may be as safely transplanted during the Summer as the Winter Solstice, provided due care be taken to keep the Root from being too much expos'd to the Air, and dry'd too soon. About the beginning of *July* the Buds for the autumnal

tumnal Shoot begin to be stretch'd forth, and the other Buds of the Vernal Shoot are fully form'd and strengthened. Now again the Root ceases to stretch forth its Fibers, the Autumnal Shoot is lengthen'd, the Fruit and Seed is ripen'd, and scarce any Provision is made for strengthening of the Bark and Wood before the latter end of *September*, when the Fruit is shaken off, and the Leaves begin to drop; and henceforward, until the Spring, the two Shoots of the preceding Season are strengthened, the Bark and Wood more plentifully nourish'd, and the Root sends forth a new Supply of Fibers. And why should this decay of the Annual Surface in Plants seem so strange to some, that they must needs attribute it to the return of the Sap to the Root, as if it were not to be observ'd in Animals also, as one of the Consequences of their Vegetative Life. Most of the *squamous Fish* throw their *Scales* every Year; for in some Seasons they shall be catch'd very rough, and at other Times with very smooth *Scales*. The Reptiles, such as *Serpents*, throw their Skin, called upon that account their *Exuvia*, most Birds throw their *Feathers*, and most Quadrupeds their Hair. The Hart and Roebuck throw their Horns; and who will be at Pains to observe it, the Hair in a Man or Woman's Head do's not continue above two Years, and scarce so long, especially if the Person is young; and

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I hope none will fay because of that, that the Circulation of the Blood is stop'd.

The *Leaves*, which as I laid, arise alternately or in Pairs, are so obvious, that I need give no particular Description of them, but I may enquire into their Use. Their being Ornamental, or a Shade to the Fruit, is not all, though it is very agreeable to see a Tree cloath'd with Leaves; and when they are eat up by Caterpillars, or blasted and burnt up by Lightening, the Fruit either aborts; or if it chance to ripen, it is still dry and unfavoury: Yet they seem to be design'd for a more special Use, and to contribute more for the vegetable OEconomy of the Plant than has hitherto been imagin'd, which is for the better Attenuation of the Sap, as is observ'd *Page 350*, when by frequent Circulations it is not only render'd more fit for the Formation of the Fruit and Seed, but also to be adapted to the Substances of the Wood and Bark in the Winter-Season, when the *Tubuli* and Pores are more contracted, and where the grosser Particles cannot so conveniently enter. If we consider the special Care to separate the Spermatick Particles by the various Turnings and Windings in the *Testes*, and that prodigious Number of most minute Glands in the cortical Part of the Brain, for the Secretion of the most subtile Particles of the Blood there, this Use for the Leaves may be the more easily comprehended. This is farther illustrated

illustrated, page 248, &c. *Essay* 4. when treating of the Preparation of the Sap for the Male-*Farina* in the Flowers, and Female Seed in the Fruit of Plants; and Page 342, when speaking of the *Poppy*: To which I need add no more, but that though the Flowers are form'd in Buds of one or two Years old in most Trees and Shrubs; yet the Vine produces them from the Vernal, and sometimes from the Autumnal Shoots of the same Year, as it was to be observ'd this Season in the *Physick Garden* in *Chelsea*, and Mr. *Fairchild's* at *Hoxton*, when it produc'd ripe Grapes at *Michaelmas*. The Buds upon the former Years Shoots are fully form'd in the *July* preceding, where may be plainly describ'd the Clusters of the Buds of *Flowers* within one *common Blossom*. Its natural to suppose the Buds may be form'd, and bear upon Shoots of the same Year in them, because where they have Vineyards, they cut down the Vine yearly to the Ground; for the Sap circulating throughout the whole Plant in the Winter-Season, would weaken the Root too much. The Pores in the Extremity of the Fibers of its Root, are so wide, and the *Tubuli* proceeding from them so large, that by applying a Glass Tube to one of the Branches transversely cut in the Spring, so adapted that none of the Sap can flow down from the Stump and be spilt, it will visibly ascend or descend in the Day-time, according to the degree of Heat, as if it were a Weather-Glass. This reciprocal
Motion

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Motion of the Sap, sometimes more to the Root, at other Times more towards the top; now to the Annual, then to the Perennial Surface of the Tree, is rather a Confirmation than a Contradiction to the Opinion of its continual Circulation, which by what I have said may seem to be undeniably prov'd; but for the farther illustrating of it, I shall take under Consideration the several Kinds of Graftings.

1. That by the *Slip*, which is perform'd in the Months of *February*, *March*, or *April*, when the Shoot cements and incorporates with the Stock, the Sap first flows out at the incis'd Stump, and forms a *Callus* until it has forc'd its way into the *Tubuli* of the Shoot; after which it flows no more out at the Stump, but ascends and descends betwixt the Stock and Graft as formerly when the Stock was entire.

2. By *Inoculation* this is perform'd in the latter end of *June* or beginning of *July*, according to the *Setting-Time*. I refer the manner of doing it to expert Gardiners, whose Business it is. The inoculating of a *strip'd Bud* into a plain Stock, and the Consequence that the Stripe or Variegation shall be seen in a few Years after, over all the Shrub above and below the Graft, is a full Demonstration of this Circulation of the Sap. This was first observ'd by Mr. *Wats* at *Kensington*, about 18 Years ago: Mr. *Fairchild* perform'd it 9 Years ago; Mr. *Bradly* says he observ'd it

it several Years since ; though Mr. *Lawrence* would insinuate as if he had first discover'd it*. That Experiment perform'd in a *Jessamine*, is now to be seen in Mr. *Fairchild's* Garden. In *July 1717*, having a plain *Jessamine*, which mounted pretty high upon the Wall, being an old Shrub with two large Trunks arising from the Root, at one Foot Distance, where both were covered with Earth. He inoculated a strip'd Bud in one of the Stocks, which was four Foot high. *Last* Year it put forth several Shoots very elegantly strip'd ; and this Season several Stripes and Variegations appear upon the other Trunk, which is above six Foot high. This not only proves an Ascent and Descent of the Sap in the same Trunk, but also that it circulates throughout the whole Plant to a great distance ; for modestly speaking, there appear'd this Year Stripes upon Leaves no less than twelve Foot distant from the Place where it was engrafted.

The consequence of these Graftings makes good my Assertion, p. 340. *That the difference of the several Compositions depends upon the several Configurations of the Pores, which only admit of Particles of such and such a Figure, and deny Entrance to any other ; or if they do enter, they must be molded and fashioned according to the frame of the Pore.* For here we see, that after a

* *Clergyman's Recreation*, p. 65.

Bud or Slip is inoculated or grafted in the Stock of another Tree, whatever passes the *Callus* (this cemented part) betwixt the Stock and Graft, partakes of the Nature of the Graft, and not of the Stock. Nay farther, that the Stock below shall, in process of Time, be of the same Texture with the Graft above, but the Graft above never alters from what it was, before it was taken from the Mother-Tree; or if it do's 'tis to the better. This can proceed from nothing, but when the Particles ascend from the Stock, that they cannot enter the *Tubuli* in the *Graft*, until they be fitted for its Orifice, v. g. Suppose a quadrangular Particle to ascend opposite to a triangular Pore, being forc'd upwards, it must be depriv'd of some one of its Angles, that it may enter into the Pore which has only three Sides: and again, suppose a triangular Particle to ascend directly towards a round Pore, all its Angles must be rub'd off before it can have Admittance: So that the Particles which proceed from the Substance of one Combination entering that of another, must be so fram'd as to coalesce, and be united with that Substance into which it is entred, and rendred incapable of joining any more with the Substance from whence it came, and the new molded Particles augmenting in their Number as they return to the Stock in Process of Time are capable to render the Substance of the Stock, homogenious with the Graft, but the

Graft never becomes homogenous with the Stock. Hence it is that the Fruit always partakes of the Nature of the Graft; that one Tree shall produce several Fruits of different Kinds, according to the several Grafts; that the Fruit from a Shoot grafted in another Stock, shall be more delicious and fine than that of the *Mother-Tree* from whence it was taken, because the Particles have not now so easy an Admittance into its Pores as formerly, when nothing intercepted them in their Ascent from the Root; but they must be farther attenuated before they can enter the proper Pore, which is not now so parallel to the *Tubulus* below as formerly; and 'tis by the Descent of the Particles from the Graft, and their Re-ascent, that the Variegations appear in the other parts of the Shrub: A pregnant Example of which happen'd to Mr *Bridgman*, Gardiner at *Hertsford*, who engrafting a *Hedgehog Slip* into a *Holly*, the *Graft* dy'd, but another Variegation appear'd afterwards below it, upon the same Stock.

Circumcision (as the *Gardeners* call it) is a third Argument of the Circulation of the Sap. Mr *Fairchild* has in his Garden a *Wall-Pear-Tree* divided into three principal Branches. Three Years ago he cut off the Bark, round each of them (in the Month of *May* or shortly before the Setting-Time) in two Places, at about three Inches distant, and made the Wood very bare betwixt the Incisions. In

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the *September* following the Bark swell'd very much above the Incision. The Spring following they produc'd Fruit very plentifully, and so they have done every Year since: So long as the Bark remain'd disunited, they never put forth any *Wood-Shoots*, but produc'd *Flower* and *Leaf-Buds* very plentifully; so that the Sap which was formerly bestow'd upon the Shoots, is now spent upon the *Bearers*, as they are called, *i. e.* upon the *Flower-Buds*. Not long after, the cortical Fibers were extended, and the Bark join'd from above and below in that part of the two lateral Branches which is toward the Wall, since which they do not produce Fruit so plentifully; but they begin again to make for the encrease of the Tree, by putting forth *Wood-Shoots*. But the Bark in the *middle Branch* still remaining disunited, continues to fructify plentifully, sends forth no *Wood-Shoots*; and as it begins to blossom more early in the Spring, so having drop'd its Leaves a Week before *Michaelmas*, the Leaves of the other two remain till past the middle of *October*. From the beginning of *September*, after setting of the *Autumnal Shoot*, the additional *Strata* of the Bark plainly appear by a new Tumefaction or Swelling at the upper part of the Incision. Below the Incision the Branch is only four Inches round. About the bare Wood, where 'tis depriv'd of the Bark, it is three Inches, and above the Incision it is six Inches. This Augmentation

in the Bigness of the Branch, clearly demonstrates how the Sap, being interrupted in its Descent, immediately returns toward the top; that the Circulation is as well maintain'd from the incis'd part as from the Root, and that the annual Surface may, upon extraordinary Occasions be as well nourish'd by the *ligneous as cortical Fibers*; for if (in this case) the Sap did not ascend by the Wood, it would not return so plentifully by the Bark, especially after so much is spent upon the Fruit and Leaves, beside what flows out by the insensible Transpiration.

This Experiment alone is able to clear up the Debate, Whether the annual Surface is nourish'd by the Bark or the Wood; and along with the Observation of the *stript Jessamine*, to shew that the Bark and Wood have not two distinct, but one common Circulation: For if the tinctor'd Sap descended four Foot, pass'd through the Root under Ground to another Stock which mounted six Foot, and has been seen upon the Leaves in several Branches of that Stock, perhaps at two or three Foot Distance; (to all which I have been an Eye-Witness) and if the same has been observ'd by others upon twenty different Plants of *Jessamine*, as Mr. *Bradly* affirms, that puts it past all doubt, that the Sap has as common and free a Circulation throughout the whole Body of Plants, as the Blood circulates in Animals. If 2. By bereaving the Trunk or Branch of a Tree of its
its

its Bark, it shall fructify more plentifully, not only the first Year, when it may be suppos'd the Sap already mounted above the incis'd part may do it; but for ever after, so long as this *Solutio Continui* remains of the Bark; and if its observ'd, that no sooner do the cortical Fibers unite, than this plentiful Fructification ceases, and the Tree makes more to the Wood than to the Fruit as formerly, which it continues to do until another Incision is made after the same manner. This to me seems very evident, that though the Bark and Wood are two different Substances, yet there must be such a Communication betwixt their *Tubuli* at the Extremities, as there is betwixt the Arteries and Veins in Animal Bodies, by which the Circulation is freely maintain'd. Therefore Mr. *Parent* his Examples of the *Elm-Tree*, which was depriv'd of its Bark from the Root to the Branches, and yet produc'd Leaves; of other four *Elms* in the *Garden of Luxemburgh*, that were stript quite naked from a little above the Ground, to pretty high in the Trunk (and one of the four which had no Bark left at all) yet liv'd four or five Years, and produc'd Flowers and Leaves; and of the *Platanus* or *Maple-Tree*, that being depriv'd of its Bark, it was soon cloath'd with more, as the Serpent is with a new Skin, may well be credited. But I am not of his mind, that the *Pith* affords any Nourishment to the

“ Plant, as he would pretend in the *Elder*
 “ and *Vine* while they are young, and after-
 “ ward by the *Ligneous Fibers* while they
 “ are old. Neither is it a Proof that the
 “ whole Nourishment is deriv’d from the *Lig-*
 “ *neous Fibers*, because of the sudden en-
 “ crease of the Slip after Grafting *. But in
 my humble Opinion the Bark and the Wood
 are nourish’d by proper *Tubuli* belonging to
 each; the annual Surface is more peculiar-
 ly nourish’d by the *Tubuli* common both
 to the Bark and it; the *Pith* has no pro-
 per Vessels for its Nourishment, but is on-
 ly a *Depositem* of some certain Particles
 at the beginning, or during the Formation of
 the *Ligneous Fibers*, as has been observ’d, but
 upon any extraordinary Emergency there
 is such a Communication betwixt them, that
 the one very readily supplies the Defect of the
 other, which may be farther confirm’d by the
 following Example.

Mr. *Fairchild* informs me, That if this In-
 cision is made upon the Trunk a little above
 the Ground, before it has emitted any lateral
 Branches then it is ready to kill the Tree;
 but if it has sent forth but one small *Twig* of
 the Bigness of one’s *Finger* or *Thumb*, that
 will save the Tree alive. The Reason is plain;
 for the *Root* being depriv’d of the return of

* *Histoire del Academie Royal des Sciences, pour L’an. 1711.*
 p. 55. Edit. Amst. 8^{vo}.

the Sap by the Bark, all of a sudden it perishes, because what descends by the *Ligneous Fibers* is not able to support it; but when it receives a little by this small *Twig*, and when the Sap, now diverted, flows more plentifully into it, this, by a more speedy return is capable to maintain the Circulation betwixt the Root and it for some time, until the Sap flowing more plentifully and perpendicularly by the *Ligneous Fibers*, supplies the Defect of the Bark, and nourishes the *Annual Surface*, by opening a more free Communication at the top, betwixt the cortical and ligneous *Tabuli*, so that the Particles formerly employ'd in forming the *Wood-Shoots*, are now spent upon the *Leaves, Flower and Fruit*. Hence it is that the *Leaves and Flowers* blossom more early, the Fruit is more plentifully produc'd, because nothing remains for lengthening and encreasing of the Wood.

This Method of explaining the Nourishment, is, I hope, so convincing, that hereafter there shall remain no more doubt of the *Circulation* of the Sap. What now remains, is to enquire what is the *Materies* of this Nourishment, or whence it proceeds. The *Materies* is a *Congeries* of heterogenous Particles, so regulated and dispos'd, as to be capable to enter the Pores of different Plants, according to their several Configurations. I have hitherto spoken of the Earth, as the Element endow'd with the greatest quantity of these Par-

ticles; but if any of them are in the Water and Air, that do's not hinder their being admitted, so as to make up the *Compositum* of the Plant, provided they enter *Via Ordinaria*, as it may be call'd, by the Extremity of the *Radical Fibers*, as by the Mouth in *Animals*; for as no *Animal* can be nourish'd by what it receives into the Pores, no more can any Plant be nourish'd but by what it receives by the Extremity of its Fibers, whether it be by Slip or Root; nor can any Plant be nourish'd by *Air* or *Water*, otherwise than by such Particles suspended in these two, as are usually contain'd in the Earth.

Dr. Woodward is in the right when he asserts, that the Water do's not nourish a Plant; but when he affirms, *That a great part of the Terrestrial Matter that is mix'd with the Water, ascends up into the Plant as well as the Water*, I cannot join with him. By *Terrestrial Matter* must be meant a *Congeries* of the various Particles of which that gross Substance call'd Earth, is usually compos'd: That I am positive can never ascend up into the Plant as well as the Water. But if we are to conceive some active Particles in this Terrestrial Matter capable to be diluted, and being suspended by the Water, fit to enter the Pore of the Plant, and to be convey'd into its most intimate Recesses, by the Water,

Philosoph. Transact. No. 253. page 209.

which

which is a *Menstruum* to it; that may be easily yielded to. And for the Water it self, though it may be insinuated into the *Tubuli*, distend and stretch forth the Vessels, extend the length of the Plant, by interposing betwixt the Interstices of the nutritive Particles, and conciliating a greater Space for them to move in, thereby encrease the Weight, and augment the Bulk of the Plant; yet it can no more be said to nourish it, than a Man can be said to be fed by drinking a prodigious quantity of Water, so as to distend his Stomach. *The Doctor* (supposing the common *Nitre* sold in the Shops to be the same with the *Nitro-aerious* Particles, an Expression which some have us'd for explaining the Vegetation, and the *Lixivial Salt* in the Atmes of Wood, to be the same with the *Salino-sulphureous*) *dissolv'd, a Dram of Nitre in Hyde-Park Conduit Water, and put Mint among it in a Glass. In another Glass he dissolv'd an Ounce of good Garden Mold, and a Dram of Nitre; in a third half an Ounce of Ashes of Wood, and a Dram of Nitre, by all which he obtain'd what was to be expected, viz. the sudden Dearth of the Plant.*

What has been said of the Water, as being an *Element* by which Plants are nourished, may also be said of the *Air*, *viz.* That however it may suspend a great Quantity of dis-united and dis-join'd, heterogenous Particles, which by their Grossness and Incapacity of

^a Ibid. 206.

being long suspended, may fall down upon the Earth again, near any Plant, and by the Fluidity in the Earth it self, or by the subsequent Rain, may be so far introduc'd into the Substance of this Earth, as being apposite to, may be receiv'd by the Radical Fiber of the Plant. But I have no imaginable Idea how a Plant can be nourish'd by the Introduction of the aerial Particles through the Pores of its Surface above Ground. Therefore I am ready to assign another Use to those Vessels call'd *Tracheæ* by the Celebrated *Malpighi*, and the *Air-Vessels* to frequently mention'd by the Learned Dr. *Grew*. Their too great Fondness of these *Tracheæ* or *Air-Vessels*, having not only perverted their own penetrating Judgments, but also led others too obsequiously into their Opinions, without being at Pains to examine the Matter themselves.

But if any shall duely consider, That all Plants are nourish'd by the ascent of Particles from the Earth, supposing they did not descend in a Circulation, but that the superfluous Particles flow'd out as it has hitherto been believ'd, at the top, how can it be suppos'd that the aerial Particles can enter by these Pores, by which the other were transmitted? This would infer a quite contrary Course in one and the same Duct, which is contrary to all the Rules of Mechanism; for at this rate, either as *Theodorus Craanen* imagin'd, there must be two Kinds of Pores, viz. *Foris-intro*, and *Intro-foris*

foris Spectantes, or all the Pores in the Plant being directed the same Way, the *Transitus* of the Particles through them must have the same Course; and this must rather be an Efflux than an Influx. The great *Dispendium* in *Nicotiana*, formerly mention'd, *viz.* That of six Pound and a quarter, it lost two Pound and a half in three Days Time, is a full Proof of this; and as a further Evidence, another Plant of *Tobacco* of the same Soil, of four Pound and a quarter, has now remain'd a Week with Roots plac'd among Water; and it has rather encreased than diminish'd in its Weight, brisk and lively, enlarging Blossoms, *spreading Flowers*, and filling the *Seed*. I have already accounted how Water may be said to augment a Plant, but not to nourish it; and the Reason why this second *Tobacco Plant* still continues to be the same, is very plain; because a new Succession of Particles from the Water ascend, and succeed to those which daily continue to avolute through the Pores of the Plant; nor need I have recourse to any other Experiment than what usually happens, *viz.* when a Plant is pull'd up by the Root, according to its Texture; first the Flowers, then the Leaves begin to corrugate and become wrinkly and crumbled, or wrap'd up, and afterward the whole Plant, *viz.* the Stalk and Bark, and last of all the Wood, decay and dry up. And whence can all this proceed, but from a *Dispendium* of Particles
through

through the Pores, and that Liquor formerly in the Vessels, now evaporated in the common Air? From which I have the greatest Reason to conclude, that all the Pores in the Plants are for the Emission or Egress, and not for the Immission or Ingress of Particles into the Plant. Nor is it any more difficult to explain by this System, how the Air should become as beneficial to Plants as to Animals. 'Tis true, that Animals have real *Tracheæ*, the Wind-Pipe, or *Larynx* and *Lungs* into which the Air is admitted, and that without Inspiration as well as Expiration, they cannot live; but it is now demonstratively prov'd, that our Breathing is not in order to the Admission of aerial Particles into the Blood it self, but to render the Blood (formerly disunited by the frequent Circulations in the Vessels through which it had pass'd) more firm, compact, and its Particles by the Pressure of the Sides of the Vessels more strictly united and combin'd into *Globules*. But whereas in Animal Bodies, if by being too suddenly, or too much expos'd to the Air, the external Pores shall be shut and contracted so, that the daily Transpiration is hindered, if not quite stop'd, we feel a great Uneasiness over all our Body, and we are expos'd to various Distempers, such as *Colds*, *Catarrhs*, *Coughs*, *Rheumatisms*, *Diarrhæas*, *Fevers*, *Agues*, &c. In a word, as there is scarce any Distemper incident to us in these cold Climates, but what may be more
or

or less suspected to proceed from the Obstruction of our Pores ; so in Plants, the exposing them more or less to the Air, the affording a more or less Degree of Heat to shut or open their Pores, may make them either live or die ; make them brisk, lively, and to *sprout, bud*, put forth their *Blossoms* and *Leaves*, or *droop*, look faded, and throw their Leaves ; for if the Particles have got into the excretory Ducts in the Bark, hesitating there, it hinders the Excretion of any more from the *Tubuli* ; these, by a continual Succession of Particles from the Root, become too much distended, and the vegetative OEconomy is disturb'd throughout the whole Plant. How much will a cold and frosty Blast of Wind kill the tender Buds in the Spring, and bereave the Gardiner of a plentiful Expectation of Fruit ? so that he who hug'd himself the one Day by the glorious Appearance of *Blossoms*, one Night or two shall deprive him of all his Hopes, all these Blossoms being dry'd up, mortify'd, and depriv'd of the common Life with the Tree ; and on the other Hand, an imprudent Management in the Stove, will, by too great a Heat, force up the Sap so precipitantly, and dilate the Pores so, that the least supervenient Cold upon shutting of them, is ready to put the Plant in danger of its Life, if not kill it altogether.

This naturally leads me to the Consideration of the *Succulent Plants*, of which so
great

great a Variety has been transported to *Europe* within these Forty Years. See *Essay* 3. p. 204, 205. They are suppos'd to live by the Air, but they may rather be said to live by Water. I confess, I have not hitherto so far examin'd their Structure, as to give so general an Idea of it as will suit with all their *Phænomena*: But upon the viewing a small *Aloe* in *Mr. Fairchild's Garden*, which has a short thick Leaf, cut off as it were in the middle, being thick, broad, and as it were quadrangular at the Extremity; I say, upon beholding its Structure 'tis no wise difficult to explain several of the *Phænomena* incident to its *Congeners*. Its external Coat consists of parallel Fibers strictly combin'd and closely united together, so that its Pores must be very minute and small, with several pretty large longitudinal *Tubuli*, of different Magnitudes, but visibly cavous, running up its back part, and turning obliquely downwards, when they come to the obliquely flat Extremity. Its inner Substance is *Diaphanous* or *Transparent*, so that either the Sun-Beams, or the Candle-Light will shine through it for the Space of two Inches. This is a *Congeries* of most thin, fine, delicate, membranous *Tunicles*, intersecting each other, like the Caverns of an Honey-Comb. These *Cellulae* are full of Sap, scarcely communicating with one another, but by small minute Pores; for if you cut one Series transversly, it will be only empty'd,

ry'd, and no more will flow out. From this ocular Inspection 'tis easy to explain all the Incidents of this Plant. 1. It can be nourished by a very small Quantity of Earth, because it has no other *Parenchyma*, than its outer Membrane, and the Addition of a very few Particles will support it a long Time. 2. Not being porous, nor being enflow'd with so many Divarications into small *Tubuli*, its Sap can neither be farther attenuated, nor will the minuteness of the Pores permit it to be evaporated; so that the *Celluls* can remain along time repleated with that serous and diaphanous Liquor, without being exhausted; and after the Capacity of its Leaves is full, it may live as well suspended in the Air as in the Earth. 3. It must be kept warm in a Stove all the Winter, to prevent its Sap from being congeal'd or frozen; for if this viscid Liquor were once depriv'd of the intestine Motion of its Particles, they could never sustain the Life any more. 4. When it's to be transplanted, or any new Shoot from it improv'd, it must be suspended or lie a good time above Ground, until much of its Sap is evaporated; otherwise, when put into rich, new Ground, by the addition of too many nutritive Particles at once, 'twould be ready to be surfeited and choak'd.

Though the other *Succulent Plants* are not all of the same Substance, but some are more fibrous, others more cellulous, the Juice of
some

some milky, others viscid, and a third transparent and serous; yet they all agree in this, that their Juice is not so volatile as to evaporate speedily; their Pores are extremely small, and external Fibers compact; that when their *Parenchyma* is once well form'd, and competently nourish'd, a very small quantity of Earth will serve to do more, but rather a small addition of Water is wanting to dilute the viscid Juice, when perhaps the more tenuious Parts are evaporated, and the vast addition some of them receive in their Encrease and Weight, while in a small quantity of Earth, must depend upon the necessary Supply of Water, which keep both their vesicular and vascular Substance repleted and distended; but if there be too great a quantity of Water furnished to them, they will be ready to rot and gangrene, from too great a Distention of their Fibers. Hence it is that some of the prickly Kind will distill clear Water at the Prickles, which cannot evaporate at the Pores; and without this Bleeding, as 'tis call'd, the Plant would be ready to perish. This general Idea of them may serve until a more strict and exact Scrutiny be made into their Structures; but by all this it plainly appears they are never fed by the Air. Dr. *Udal* at *Enfield*, has a great Variety of them in great Perfection, as has Mr. *Fairchild* already mention'd, who has been so kind as to favour me with the Delineation of a few of them in Copper-Plate,
among

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among whom is the little *Cushion Aloe* now describ'd. Nor is Dr. *Sherard* wanting to enrich this *Island of Britain* with a continual Supply of new Species from his Correspondents Abroad.

I conclude with the Examination of the Principles upon which Mr. *Bradly* has founded the Generation and Vegetation of Plants, such as *Suction, Attraction, Steam* and *Vapour, Condensation* and *Stagnation*.

1. *Suction and Attraction*: The Root having suck'd in the Salts of the Earth, p. 4.— Or by its magnetick Virtue, p. 14. By its attractive Quality, p. 19. All these are reciprocal Terms, which differently express the same Thing, for *Sucking* is only a *Drawing*. Where-ever they obtain the *Vis Impellens* and the *Vis Attrahens*; the *impellent* or *sucking*, and *attractive drawing Power*, must be of greater force than the *impell'd, drawn* or *attracted Subject*. 2. There must be a *Causa Efficiens* for the *Motus* of the *Res à quo* to the *Res ad quem*. In Pumping, the *Leather* and the *Manubrium, Handle* and *Chain*, to which the *Pump-Box* and *Leather* is fix'd, are set in Motion by a Persons Hands, or some other *Engine*. In *Sucking* and *Drinking* the Motion of the *Muscles* for *Inspiration*, and of the *Cheeks*, are the *Impellents* of the *Liquor*. In *Attraction*, the Power of the *Magnes* must be greater than that of the *Steel* which it attracts.

I do not here pretend to explain how this *Attraction* and *Suction* is perform'd, that being extrinſick to my Deſign; but from hence I infer, 1. Though the Root be of greater Force than the Particles ſaid to be ſuck'd into it, yet it can never have the *Vis Impellens*, becauſe it wants the *Cauſa Efficiens*, therefore the nutritive Particles can only enter the Extremities of the Root in their accidental Aſcent; and if they were not thus intercepted by the Pore ready to receive them, they would evaporate into the common Air. Nor, 2. Can it be *imbibing* as a *Sponge*, for the Roots of Plants are ſo far from being *ſpongy*, as Dr. Grew imagines, that they are as ſolid, or rather more ſolid, and cloath'd generally with a thicker Bark, than any part of the Plant. 3. The ſubtile Particles from the *Farina* can never draw the groſs, nutritive Particles to the *Seed* in the *Seed-Veſſel*, with greater Force than the Motion already conciliated to them by the ſubterraneous Heat; but the effect of theſe Particles from the *Farina*, muſt be produc'd by Penetration. See *Essay* 4. p. 277. a pregnant Example of this Penetration is as follows: Take a Solution of *Vitriol*, and write with it upon *Paper*, the Writing will immediately diſappear and become inviſible; write above it upon the ſame Paper with Ink made of *burnt Cork*, which will be viſible; place this Writing next the Cover in one ſide of a Book,
and

and place exactly opposite to it, in the other side of the Book (suppose it to be a pretty thick *Quarto*) some Cotton dip'd in a Solution of *Calx Viva*, or *quick Lime*, and *Auripigmentum*; shut the Book close, and put it into a Press, and in a few Minutes the visible Ink shall disappear, and the invisible Ink will appear. This I have seen often done. Now if such a Penetration can be perform'd through a pretty thick Book, why may we not suppose subtile Particles may flow from the *Farina* in one part of the Flower, or from a Neighbouring Flower in the same Plant or *Species*, and penetrate the *Seed-Vessels* and *Seed*, especially since they have the same Configuration of Particles and Pores.

Steam, Vapour and Condensation. Made to evaporate in a Steam, as the Matter in a Still—When the Vapour arrives at the extream Parts of the Buds of a Tree, it meets with Cold to condense it into a Liquor, p. 4. Where there is a Steam or Vapour, there must be a large, capacious Cavity, in which the diluited and rarify'd Particles, may move freely; for if they are confin'd within a small Space or Bounds they must be strictly united, which is called *Condensation*, and then they appear *sub forma Liguoris*. And what a vast large Root must the *Vine* or *Birch-Tree* have, if this be the Case to contain the *Steam* and *Vapour* of such abundance of Liquor as flows upward from it in the Spring, or the Root of

a *Pompink*, which nourishes such large Fruit from so small a *Seed* in one Season. It were more reasonable to suppose, that the Blood in Animals were at first only a *Steam* and *Vapour*, because of the intrinsic Heat capable to rarify its Particles, occasion'd by the several ordinary and extraordinary Animal Motions; but we see the contrary, and that the Blood *sub forma Sanguinis* is contain'd in the *Tubuli* of the *Capillaries*, and at the Extremity of the Body, very near as minute as those of Plants: For it's from the Blood contain'd in the *Muscular Fibers*, that they are tingured with the red Colour, otherwise they would be as white as the *tendinous Fibers*, of which they are only the Elongations more loosely combin'd; and in how small Cavities the Blood is contain'd, may be suppos'd, when

1. By the Puncture of a Pin in the Skin, or any muscular part of the Body, the Blood shall flow out.
2. By the quantity of Blood in a humane Body, it being by a modest Computation about twenty five Pound, and yet the largest Vessel shall not be much above $\frac{1}{4}$ of an Inch Diameter; so that there must be a prodigious Number of Branchings and Divarications to contain the whole.
3. From the Injections of several accurate and expert Anatomists of this last and present Age into the most minute *Capillaries*, such as the late famous Dr. Nuyk and Rysch perform'd, and of which Mr. St. Andre,

André in *Northumberland Street* lately shew'd some curious Preparations to the *Royal-Society*.

I say, if all these shew that the Blood is never *sub forma Vaporis* in the Animal Bodies, where the natural Heat would be more ready to turn it into Steams, we can never suppose such *Steam* or *Vapours* to be in the Bodies of Plants, which are only endow'd with, as it were, a borrowed Heat, to set its nutritive Particles in Motion; but its more reasonable to think, that after one Particle has entred into the Pore of a Root, another may follow in that same Passage in a direct Line, and still more succeeding, the one presses up the other; that several of these minute *Tubuli* may be conjoin'd so as to form larger Trunks, and although the *Succiferous* Vessels are not to be seen so large in Plants as the Blood Vessels in Animals, because the quick Motion of the one is not so requisite as the other (for the heterogeneous Particles of the Blood must circulate more frequently, to be farther attenuated and prepar'd; whereas the nutritive Particles in Plants are prepar'd by their very entring into the Pore, otherwise they could not be receiv'd) yet there is the same Reason for the nutritive Particles of Plants to be condensed into a *Liquor* at first, as the Blood in Animals. And I cannot understand, 2. How the Buds of Plants can be form'd by the Vapours being condens'd and thicken'd into a Water when

D d 3

they

they feel the Cold, p. 5. At that rate the *Buds* would be best form'd at *Christmas*, soonest come to blossom, and be most readily blown in the *coldest Spring*, which is quite the reverse from what really happens; for it's in the Heat of the *Month of July* that they are form'd, and it's by the *warmest Spring* that they are cherish'd and the most early *blown* and brought to Perfection.

Stagnation. The Sap is thicken'd or condens'd by the *Winter's Cold*, and is thereby chang'd into the Consistency of Gum; and being thus stagnated, cannot move any more until the following Spring, p. 7. That the *Warmth*, or some artificial Heat rarifies it into its former liquid State. No *Liquor* in *Area Circulationis*, can stagnate without the Succession and Accumulation of the subsequent, circulating Particles, which must be the cause of a preternatural Dilatation of the Vessels, from whence a *Tumour*, (as in the obstructed Glands in the *Animal Bodies*) such as *Scrophulous Tumours*, *Steatoma's*, *Sarcoma's*, &c. must be generated. And 2. No circulating Liquor can thicken, unless it is by the *Evaporation* of the more subtile, and the *Precipitation* and subsiding of the more gross Particles, the *Serum* which remains not being able to suspend them any more; and if the more intimate Union of this circulating Liquor is thus dissolv'd, no means whatever can make it to circulate aright again; and if that cannot be
obtain'd,

obtain'd, it must become vapid, turn acid and acrimonious, as the Blood in the obstructed part of a Body becomes *ichorous*, and is so corrupted as to become *laudable Pus*, which at last becomes *serous*, *acrimonious*, and almost *corrosive*. But 3. This balsamick thickening of the Liquor was never yet observ'd; for all Plants that live in the Winter are observ'd to be as juicy at *Christmas* as *Midsummer*, and this Juice is as thin in the one Season as the other, which necessarily implies its circulating throughout the whole Year.

He says, (*Philosoph. Transact. N^o. 349. p. 487.*) *The Seasons of Motion in Plants, are the same with those Animals which sleep during the Winter.* This is for want of distinguishing betwixt the Animal and Vegetative Life; for *Swallows* and *Cuckoo's*, &c. have their Blood circulating in the proper Vessels, though its Motion is perhaps not so quick in the Winter, as much as it do's in other Animals while asleep, when the Animal Functions do not exert themselves.

I shall only add in this Place, that the Parenchymatous Fruir has a peculiar Circulation, as I have observ'd before in the Parenchymatous Roots; for heretofore they were wont to import *Melons* from *Portugal* and *Spain*, by leaving a good deal of the Stalk adherent to them, the better to entertain this Circulation, which is called the feeding of them. *Oranges* and *Lemons* are pull'd green from the Tree,

otherwise they rot in the Importation; and most of our Winter-Fruit ripens, after being shaken off the Tree. So long as the Circulation continues, the Particles are farther attenuated, and they live; but when that ceases they rot as much as the Flesh of an Animal corrupts and stinks when the Animal is dead.

Thus I hope I have prov'd the Circulation of the Sap in Plants, to be the same with that of the Blood in Animals, in so natural, plain, and intelligible a manner, that after its being so fully discovered, the Vegetation of Plants needs be no longer a Mystery. I could have added a great deal more, and explain'd a great many other *Phænomena*, but I doubt not what I have said may be a means to engage others to make farther Improvements upon these Hints.





APPENDIX

To be added to p. 271. l. 22.

in any Flowers whatsoever,



ILLENIVS confirms my Assertion, that the *Apices* are never wanting ~~in the~~ by the Example of the [^]

“ DYCOTOPHYLLUM, where he observes,
 “ that this being a Water-Plant, has naked
 “ and solitary Seeds, *i. e.* one Seed to each
 “ Flower : That both Flowers and Seeds are
 “ surrounded by certain *Laciniae*, and that
 “ the Flowers have neither *Petala* nor *Stamina*, but only *Apices*; and though contrary to most of the other Water-Plants
 “ (for the Flowers in them often mount above
 “ the Water when they begin to spring forth)
 “ these *Apices* are usually dip’d in the Water;
 “ if they are squeez’d or press’d, as in
 “ the Heads of the *Musci*, they shed a soft
 “ and pulposus Matter (like that which is
 “ found in the unripe *Apices*) which being
 “ dry’d, appears globulous by a Microscope.
 “ He has not yet observ’d whether these *A-*
 “ *pices*


“ *pices* burst in the Water, for all he has seen
 “ were whole, though some of the Seeds were
 “ almost ripe; which shews, that though they
 “ were not open, yet there is no doubt the *se-*
 “ *minal Effluvia* might flow from them, and
 “ impregnate the Seed, because the *Apices*
 “ are very near to them. Nor, perhaps, is
 “ it necessary that the *Apices* should burst,
 “ and be like such of the airy *Apices* (*ae-*
 “ *reorum Apicum instar*) as are upon Land-
 “ Plants, which shed the Dust to cover
 “ the Seed, when 'tis as reasonable to sup-
 “ pose, that in the form of a Juice the
 “ Matter might flow from the *Apices* in-
 “ to the Water, and be so convey'd as to
 “ impregnate the Seed. And this seems to
 “ him no small Argument that the *Apices* in
 “ the *Hippuris* are after the same manner,
 “ and that they are only flowering *Globuli*
 “ or *Folliculi*. This Plant is call'd *Equise-*
 “ *tum palustre Ramosum & aquis immer-*
 “ *sum. Millefolium aquaticum cornutum,*
 “ C. B. *Raii Hist.* p. 191. Though in his
 “ Supplement, p. 122. he makes the *Mille-*
 “ *folium aquat. cornutum*, C. B. to be dif-
 “ ferent from the *Millefolium aquat. cornu-*
 “ *tum*, J. B.^a. This Observation answers to
 what is said, p. 299. and likewise shews *Dil-*
lenius to be of the Opinion, that it's the
Effluvia which impregnates, and not the

^a Dillen. *Nova Plantarum Genera*, p. 91. Tab. iii.

Farina in Substantia, which becomes the Seed.

There is a Male Tree of this

To be added to the same Page, Line ult. *Kind, and*

Boccone gives the following Account of the *Palma Dactylifera*, which he calls *Pistacium Mas Siculum Folio Nigricante*.  *a Female.*

~~There is a Male Tree of this~~ The *Mas* has
 “ its Leaves oval, oblong, thick and dark-
 “ green arising regularly by three and three,
 “ upon a Pedicle, whereof there is one Pair
 “ and an odd one at the Extremity. The
 “ Flowers are thick set *racematim dispositi è*
 “ *foliorum alis*. The Female Tree has its
 “ Leaves of a lighter green, larger, harder,
 “ and consisting of five Leaves upon a Pedic-
 “ cle. The *Embryones* are *Spicatum Dis-*
 “ *positi*.

“ When they are at a great Distance from
 “ each other, they fecundate the Fruit, and
 “ make it swell or conceive after the follow-
 “ ing Manner. They wait until the *Embry-*
 “ *ones* of the *Femina* begin to appear; they
 “ take a Branch of the *Pistacium Mas*, and
 “ place it in a Vessel surrounded with Earth,
 “ and moisten'd with Water; this they hang
 “ upon a Branch of the *Pistacia Femina*,
 “ where they suffer it to remain until the
 “ Flowers are blown, the *Apices* have burst,
 “ and the Dust is shed, and blown by the Wind
 “ over all the *Pistacia Femina*. By this
 “ Means the Fruit of the *Pistacia Femina* is
 “ impregnated and begins to swell. “ The

“ The *Pistacium Mas* flowers before the
“ *Fæmina*. There is another way of fecun-
“ dating the *Embryones* of the *Fæmina*. They
“ take the Buds of the Flowers of the *Mas*,
“ and put them in a Bag of thin Lawn, and
“ when they are dry they dust over all the
“ Female Tree with the *Powder* or *Farina*
“ from this Bag. 'Tis necessary to take the
“ Flowers before they are blown, for they
“ very soon shed the Dust, which is of a yel-
“ low Colour. The Peasants use to try this
“ Experiment, by taking a little of this Dust
“ of the Male-Flowers, and laying it upon
“ the *Embryones* of the *Fæmina*, they ob-
“ serve shortly thereafter, that they begin to
“ swell as a Woman uses to conceive after
“ she has been impregnated by a Man.

“ It is observ'd, that if the Male Dust is
“ shed before the Female begins to germinate
“ or bud, in this Case the Fruit shall not fill,
“ but be ready to abort and miscarry, there-
“ fore they provide themselves with the dry'd
“ *Male-Flowers*, that they may dust the
“ Fruit over, and dispose it to encrease and
“ ripen.

“ When there are a great many Male and
“ Female-Trees together, they are not so
“ careful to preserve the Male-Flowers, be-
“ cause the Dust is blown by the Wind, and
“ communicates the *prolifick Virtue* to the
“ Fruit upon the Female Tree of its own ac-
“ cord.

“ They

“ They are so careful over all *Sicily* to provide themselves with the Male-Flowers, and so exact in their Observation, that they know when such Branches of the Female-Tree have been dusted over with the *Farina*, for then they will produce Fruit abundantly; and if any of the Branches seem to fail in the Fructification, then they strew them over with the Dust.

By this Account, which may be seen at large in *Boccone*^a, it appears he is of the Opinion, that the *Effluvia* from the *Farina*, impregnate the Seed, as well as *Dillenius* and the several fore-mentioned Authors.

To be added to Mr. Fairchild's Experiment of the Circumcision, p. 391. l. 20.

If only an Inch of this Bark is taken off in the Month of *May*, against the latter end of *August*, the Bark shall encrease downwards, and join with the lower part of the Incision. In that Case it shall put forth Wood-Shoots next Year; but it shall still continue to fructify more plentifully until the whole Incision is supply'd with Bark; but if the Incision is three or four Inches long, then the Bark do's not so readily join. This shews that the Bark has distinct nourishing Vessels from the

^a *Boccone Museo di Fisica & di esperienze variato, & decorato di Osservazioni Naturali Osservazione quarantesima quarta, p. 282. Museo di piante rare della Sicilia, Malta, &c. p. 139. Edit. Venet. 1697.*

Wood, and that the Sap descends as well as ascends by the Bark. 2. He made an Experiment by topping of Fruit-Trees thus: He chose two young Pear-Trees of the same Soil, and of an equal Growth; he topp'd the one in *September* by taking off several of the Vernal and Autumnal Shoots of that Year. The other he topp'd in the Spring following; and that which he topp'd in the Spring, push'd forth longer Shoots than that which he top'd in the Autumn, by which it appears that the Sap took another Course in the Autumn, and was bestow'd upon the Nourishment of the Bark, so that it did not so soon ascend in a direct Line as that which was topp'd in the Spring, when the Sap had not been diverted from its direct Ascent and Descent during the Winter.

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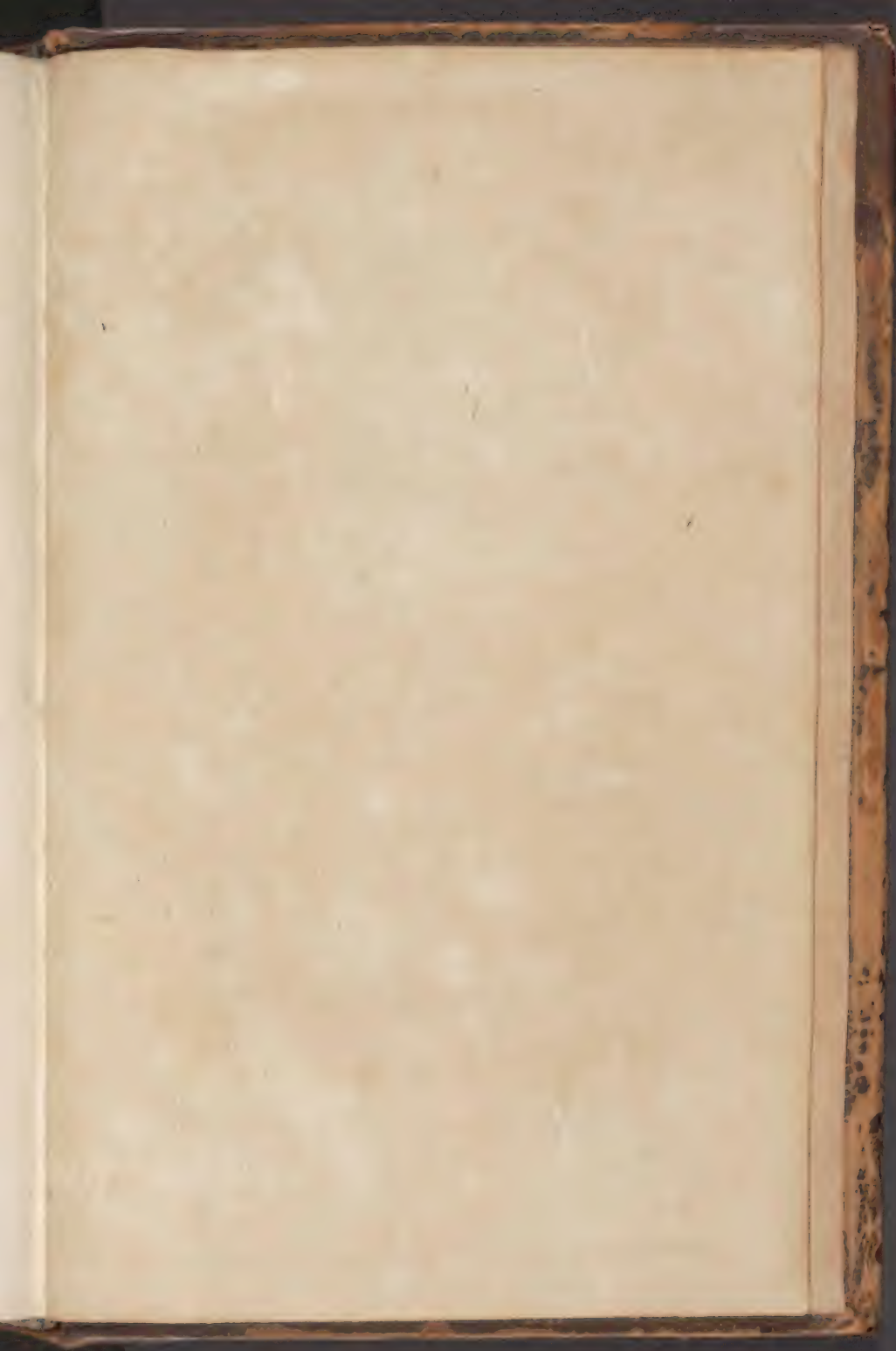
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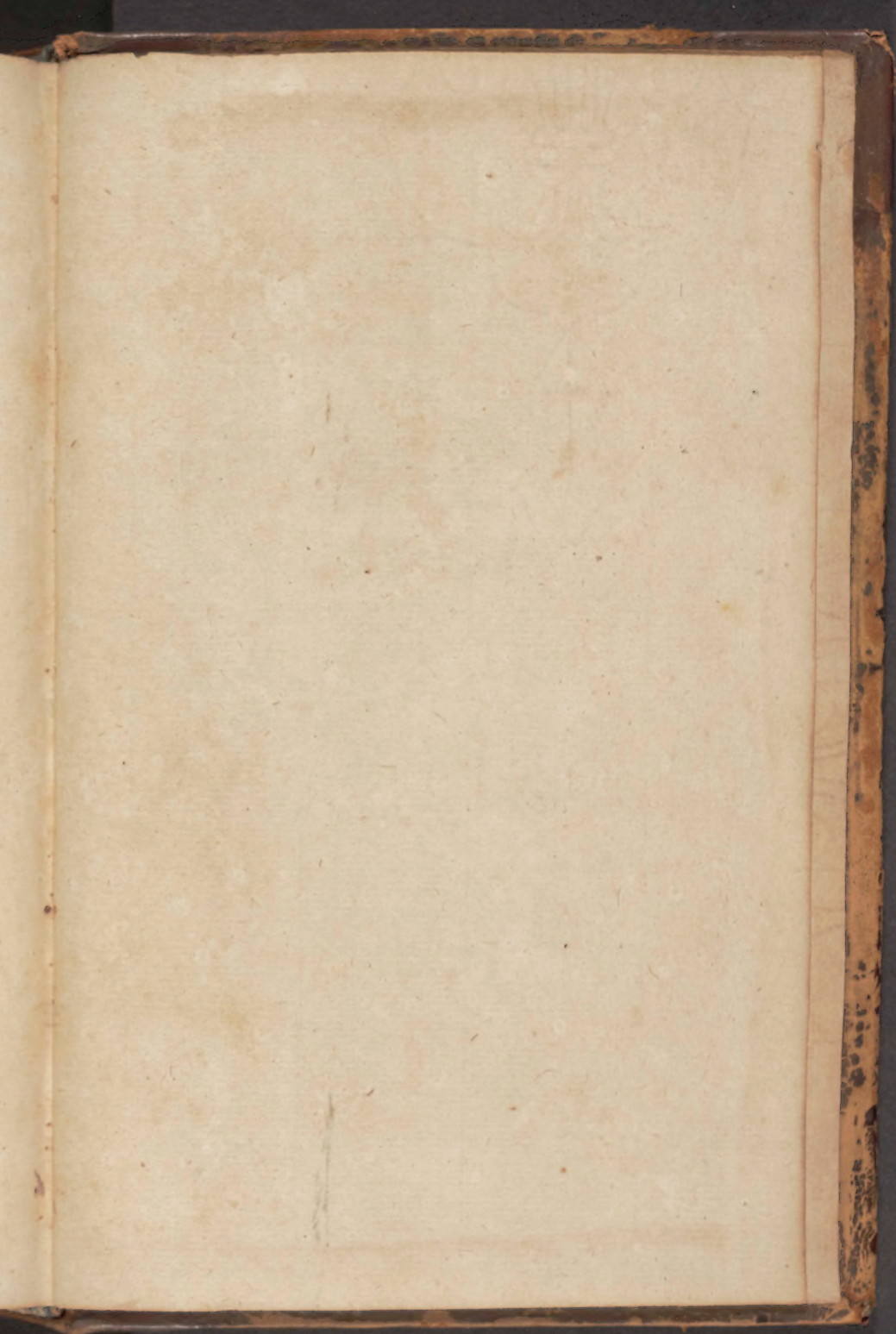
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